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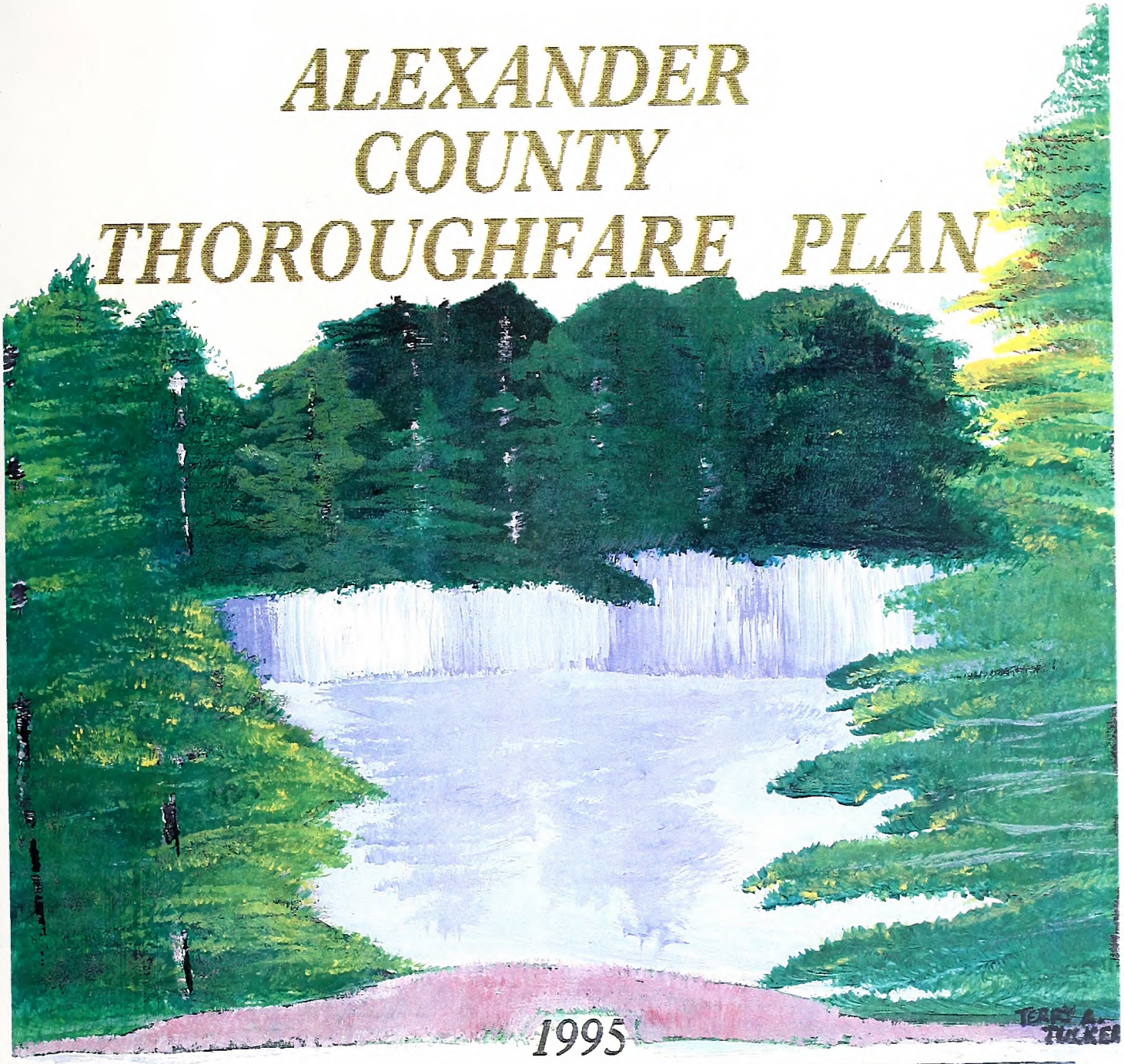
North Carolina Department of Transportation
Division of Highways
Statewide Planning Branch

ALEXANDER COUNTY THOROUGHFARE PLAN



1995

THOROUGHFARE PLAN

FOR

ALEXANDER COUNTY, NORTH CAROLINA

Prepared by the:

Statewide Planning Branch
Division of Highways
N. C. Department of Transportation

In cooperation with:

The County of Alexander
The Federal Highway Administration
U. S. Department of Transportation

August, 1995

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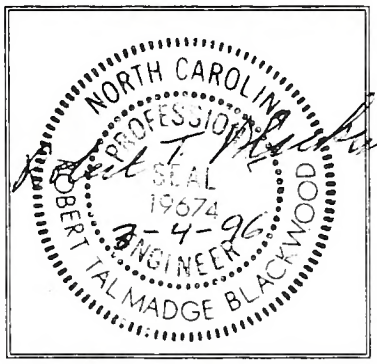

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1. INTRODUCTION

A well planned transportation system is an asset to the economic and social well being of a growing community. It provides the means to transport people and goods from one place to another quickly and conveniently. A good highway system must not only meet existing travel demands, but must also keep pace with the development of the region. This report will set a system of major roads and highways required to satisfy the anticipated needs of Alexander County for the next twenty five years. Certain priorities shall be established in the development of the thoroughfare system. These priorities will be based on maintenance needs, bridge inadequacies, poor alignments, and insufficient present and future roadway capacities.

The proposed Alexander County Thoroughfare Plan was developed following the basic principles of thoroughfare planning as described in Chapter 3 of this report. The plan recommends those improvements that are felt to be essential for proper traffic circulation within the 1995-2020 planning period.

Most of the proposed improvements will be the responsibility of the North Carolina Department of Transportation. However, Alexander County can provide assistance in the implementation of the plan through subdivision regulations and zoning ordinances. It will be desirable for the plan to be formally adopted by both the County Commissioners and the North Carolina Department of Transportation to serve as an official guide in providing a well coordinated, adequate, and economical major thoroughfare system.

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http://www.archive.org/details/thoroughfareplanalexa

2. THOROUGHFARE PLAN

The thoroughfare plan outlines the transportation system network according to each roadway's function within the system. Each road in the thoroughfare plan was evaluated based on the following factors: alignment, capacity, width, number of lanes, traffic volume, land use patterns, and pavement structure. Suggestions for the improvement of roads are made based on these factors.

The recommended thoroughfare plan for Alexander County is shown in figure **2-A** and detailed in Appendix A. Elements of the plan are classified as urban or rural. The areas around Hickory and Taylorsville are delineated as an urban thoroughfare planning area since a mutually approved thoroughfare plan exists between NCDOT and the municipalities.

Only major thoroughfares classified as to either existing or proposed are shown within the urban thoroughfare planning area in figure **2-A**. This was necessary due to the limited amount of detail that can be shown on the county level.

Elements of the Alexander County Plan are as follows:

Minor Arterials:
US 64/ NC 90
NC 16
NC 90 Bypass

Suggestions for Minor Arterials

US 64/ NC 90 - Widen to a 5 lane curb and gutter section from NC 127 to the US 64 bypass. Widen from Taylorsville's Eastern Planning Boundary (at intersection of US 64/NC 90 and SR 1422) to SR 1001 to 3 lanes (cross section H). Widen all other sections to 7.2 m (24 ft).

NC 16 - Widen to a 4 lane boulevard (see cross section F in Appendix A) from the Catawba County line to SR 1607. In more developed areas, this should be modified to a 5-lane curb and gutter section (cross section C) to accommodate turning vehicles.

Collector Road System

The rural collector routes primarily serve intra-county travel. The major collector roads supplement the arterial system by providing an interconnecting network between smaller population centers and the arterial system. The minor collector roads collect traffic from the local roads and carry it to a higher system facility. The major and minor collector roads in Alexander County are as follows:

Major Collectors:

US 64/NC 90
NC 127
SR 1002 Antioch Church Road
SR 1005 Old Mountain Road

Minor Collectors:

SR 1001 Sulphur Springs Rd
SR 1115 Liledoun Rd Ext.
SR 1124 Church Rd
SR 1134 Friendship Church Rd
SR 1135 Wayside Church Rd
SR 1137 Rink Dam Rd
SR 1144 Icard Ridge Rd
SR 1144 Icard Ridge Rd Ext
SR 1156 Richey Rd
SR 1157 Sam Heafner Rd
SR 1165 Caldwell Pond Rd
SR 1307 All Healing Springs Rd
SR 1311 Gill Childers Rd
SR 1313 Three Forks Church Rd
SR 1328 Kirby Lackey Rd
SR 1331 Little River Church Rd
SR 1338 St. Clair Rd
SR 1403 Vashti Rd
SR 1404 Daniels Lumber Rd
SR 1407 Old Wilkesboro Rd Ext
SR 1409 Old Wilkesboro Rd
SR 1412 Black Oak Ridge Rd
SR 1418 Carson Chapel Rd
SR 1419 Rocky Springs Rd
SR 1422 White Plains Rd
SR 1423 Old Vashti Rd
SR 1456 Cheatham Ford Rd
SR 1461 Sharpe Mill Rd
SR 1503 Hiddenite Church Rd
SR 1604 Boston Rd
SR 1605 Paul Payne Store Rd
SR 1610 Millersville Rd
SR 1613 Taylorsville Manufactoring Rd
SR 1638 County Line Rd

Suggestions For The Collector Road System

Major Collectors:

NC 127 - SR 1147 to US 64/ NC 90, Widen to a 4 lane boulevard (see cross section F in Appendix A). In more developed areas, this should be modified to a 5-lane curb and gutter section (cross section C) to accommodate turning vehicles.

SR 1002 (Antioch Church Rd) - Caldwell Pond Rd (SR 1165) and Antioch Church Rd (SR 1002) could provide a short connection between US 64/NC 90 and NC 127. For this reason, the intersection should be realigned to allow access to SR 1165 from SR 1002 without a stop. In addition, Antioch Church Rd (SR 1002) from NC 127 to SR 1165 should be widened to 7.2 m (24 ft) to meet capacity needs.

Minor Collectors:

SR 1115 (Liledoun Rd) - From SR 1124 to Little River. Entire section should be widened to 6.6 m (22 ft) for safety reasons.

SR 1124 (Church Rd) - From US 64/NC 90 to SR 1137. The entire facility needs to be widened to 7.2 m (24 ft) to meet capacity requirements.

SR 1134 (Friendship Church Rd) - From NC 16 to SR 1135. For safety reasons, this section should be widened to 6.6 m (22 ft).

SR 1135 (Wayside Church Rd) - From NC 16 to SR 1134. This section should be widened to 6.6 m (22 ft) for safety reasons.

SR 1137 (Rink Dam Rd) - From SR 1135 to southern end. To meet future capacity requirements, the entire road should be widened to 7.2 m (24 ft). Also, realign SR 1137 to connect with SR 1134 (Friendship Church Rd).

SR 1144 (Icard Ridge Rd) - From NC 127 to SR 1143. This section requires widening to 6.6 m (22 ft) for safety reasons.

SR 1156 (Richey Rd) - From SR 1157 to NC 127. Widen to 7.2 m (24 ft) to meet future capacity requirements.

SR 1157 (Sam Heafner Rd) - From SR 1156 to SR 1144. Widening to 6.6 m (22 ft) on this section is required for safety reasons.

SR 1165 (Caldwell Pond Rd) - From US 64 to SR 1002. This section should be widened to 6.6 m (22 ft) for safety reasons.

SR 1307 (All Healing Springs Rd) - From US 64 to SR 1304. This section should be widened to 6.6 m (22 ft) for safety reasons. From SR 1304 to SR 1313. This section requires widening to 6.0 m (20 ft) for safety reasons.

SR 1311 (Gill Childers Rd) - From SR 1307 to SR 1313. This section should be widened to 6.0 m (20 ft) for safety reasons.

SR 1313 (Three Forks Rd) - From Muddy Creek to SR 1307. Requires widening to 6.0 m (20 ft) for safety reasons.

SR 1328 (Kirby Lackey Rd) - From SR 1313 to SR 1331. Widen to 6.0 m (20 ft) for safety reasons.

SR 1331 (Little River Church Rd) - From NC 16 to SR 1338. Widening to 6.0 m (20 ft) required for safety reasons.

SR 1338 (St. Clair Rd) - From SR 1331 to SR 1328. Section requires widening to 6.0 m (20 ft) for safety reasons.

SR 1404 (Daniels Lumber Rd) - From SR 1412 to SR 1403. Widening to 6.6 m (22 ft) required for safety reasons.

SR 1409 (Old Wilkesboro Rd) - From Muddy Fork Creek to SR 1407. Widen to 7.2 m (24 ft) for safety reasons.

SR 1412 (Black Oak Ridge Rd) - From Taylorsville's northern planning limit (intersection of SR 1412 and SR 1415) to SR 1404. Widen to 6.6 m (22 ft) to meet safety requirements.

SR 1418 (Carson Chapel Rd) - From Taylorsville's eastern planning limit (creek east of SR 1121) to SR 1423. Widen to 6.0 m (20 ft) for safety reasons.

SR 1422 (White Plains Rd) - From US 64/ NC 90 to SR 1419. Widen to 6.6 m (22 ft) to meet safety requirements.

SR 1423 (Old Vashti Rd) - From SR 1418 to SR 1419. Widen to 6.0 m (20 ft) for safety reasons.

SR 1456 (Cheatham Ford Rd) - From us 64 to SR 1461. This section should be widened to 6.6 m (22 ft) for safety reasons.

SR 1503 (Hiddenite Church Rd) - From US 64/ NC 90 to SR 1001. Widen to 6.0 m (20 ft) to meet safety requirements.

SR 1604 (Boston Rd) - From Taylorsville's southern planning limits (intersection of SR 1604 and SR 1607) to SR 1613. Widen to 6.6 m (22 ft) to meet safety requirements.

SR 1605 (Paul Payne Store Rd) - From SR 1607 to SR 1638. Widen to 6.6 m (22 ft) to meet safety requirements.

SR 1610 (Millersville Rd) - From NC 16 to SR 1605. This section should be widened to 7.2 m (24 ft) to meet capacity requirements. From SR 1605 to NC 90. This section should be widened to 6.6 m (22 ft) for safety reasons.

SR 1613 (Taylorsville Manufacturing Rd) - From SR 1605 to SR 1610. Widen to 6.6 m (22 ft) for safety reasons.

SR 1638 (County Line Rd) - From SR 1005 to SR 1605. Widen to 6.0 m (20 ft) for safety reasons.

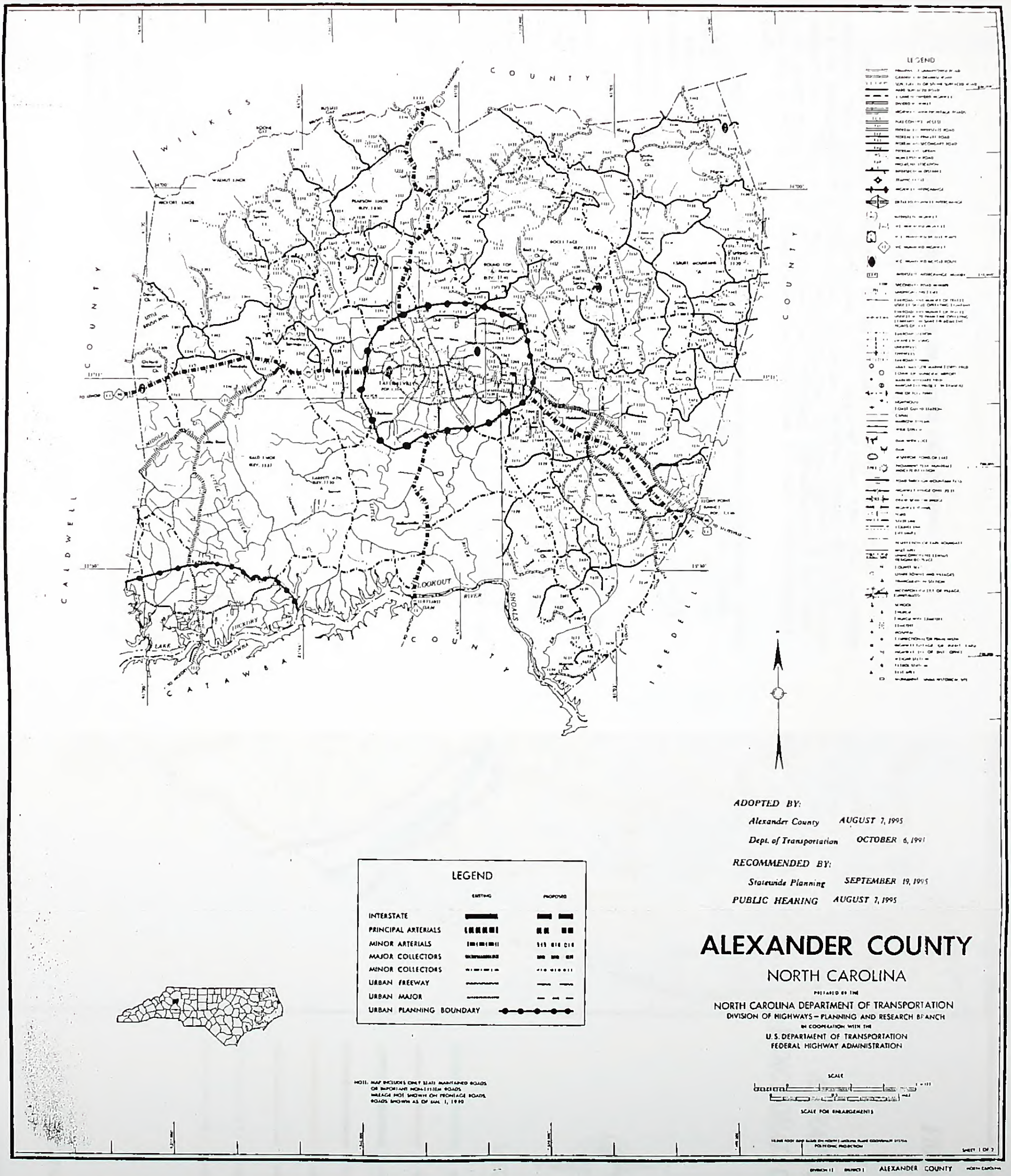

WILKES COUNTY
CALDWELL COUNTY
CATAWBA COUNTY
IREDELL COUNTY
LOOKOUT
SHOALS
LEGEND
ADOPTED BY:
Alexander County AUGUST 7, 1995
Dept. of Transportation OCTOBER 6, 1991
RECOMMENDED BY:
Statewide Planning SEPTEMBER 19, 1995
PUBLIC HEARING AUGUST 7, 1995
LEGEND
INTERSTATE
PRINCIPAL ARTERIALS
MINOR ARTERIALS
MAJOR COLLECTORS
MINOR COLLECTORS
URBAN FREEWAY
URBAN MAJOR
URBAN PLANNING BOUNDARY
ALEXANDER COUNTY
NORTH CAROLINA
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS – PLANNING AND RESEARCH BRANCH
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
SCALE
SCALE FOR ENLARGEMENTS
ALEXANDER COUNTY

FIGURE 2-A

3. COUNTY THOROUGHFARE PLANNING PRINCIPLES

Purpose of Planning

There are many benefits to be gained from thoroughfare planning, but the main objective is to assure that the road system will be progressively developed to serve future travel desires adequately. Thus, the main consideration in thoroughfare planning is to make provisions for street and highway improvements so that, when the need arises, feasible opportunities to make improvements exist.

Streets, roads, and highways have two primary functions: they provide traffic service and land service. When combined, these two services are basically incompatible. This conflict will not be serious if both traffic and land service demands are low. However, when traffic volumes are high, excess conflicts created by uncontrolled and intensely used abutting property result in intolerable traffic flow friction and congestion.

There are two major benefits derived from thoroughfare planning. First, each road or highway can be designed to perform a specific function and provide a specific level of service. This permits savings in right-of-way, construction, and maintenance costs. It also protects residential neighborhoods from cut-through traffic and encourages stability in travel and land use patterns. Second, local officials are informed of future improvements and can incorporate them into planning and policy decisions. This will permit developers to design subdivisions in a non-conflicting manner, direct school and park officials to better locate their facilities, and minimize the damage to property values and community appearance that is sometimes associated with road improvements.

County Thoroughfare Planning Concept

The underlying concept of the thoroughfare plan is to provide a functional system of streets, roads, and highways that permit direct, efficient, and safe travel. Different elements in the system are designed to have specific functions and levels of service, thus minimizing the traffic and land service conflict.

In the county plan, elements are designated as either urban or rural. In the urban planning area, the local municipality generally has planning jurisdiction. Outside the urban planning area, the county has planning jurisdiction. In those urban areas where no urban thoroughfare plan has been developed, elements are generally designated as rural and under the planning jurisdiction of the county. When a thoroughfare plan is developed for an urban area that has not previously had a plan, then the area defined by that plan is considered to be urban and comes under the planning jurisdiction of the municipality.

Within the urban and rural systems, thoroughfare plan elements are classified according to the specific function they are to perform. A discussion of the elements and functions of the two systems follows.

Urban Thoroughfare Classification System

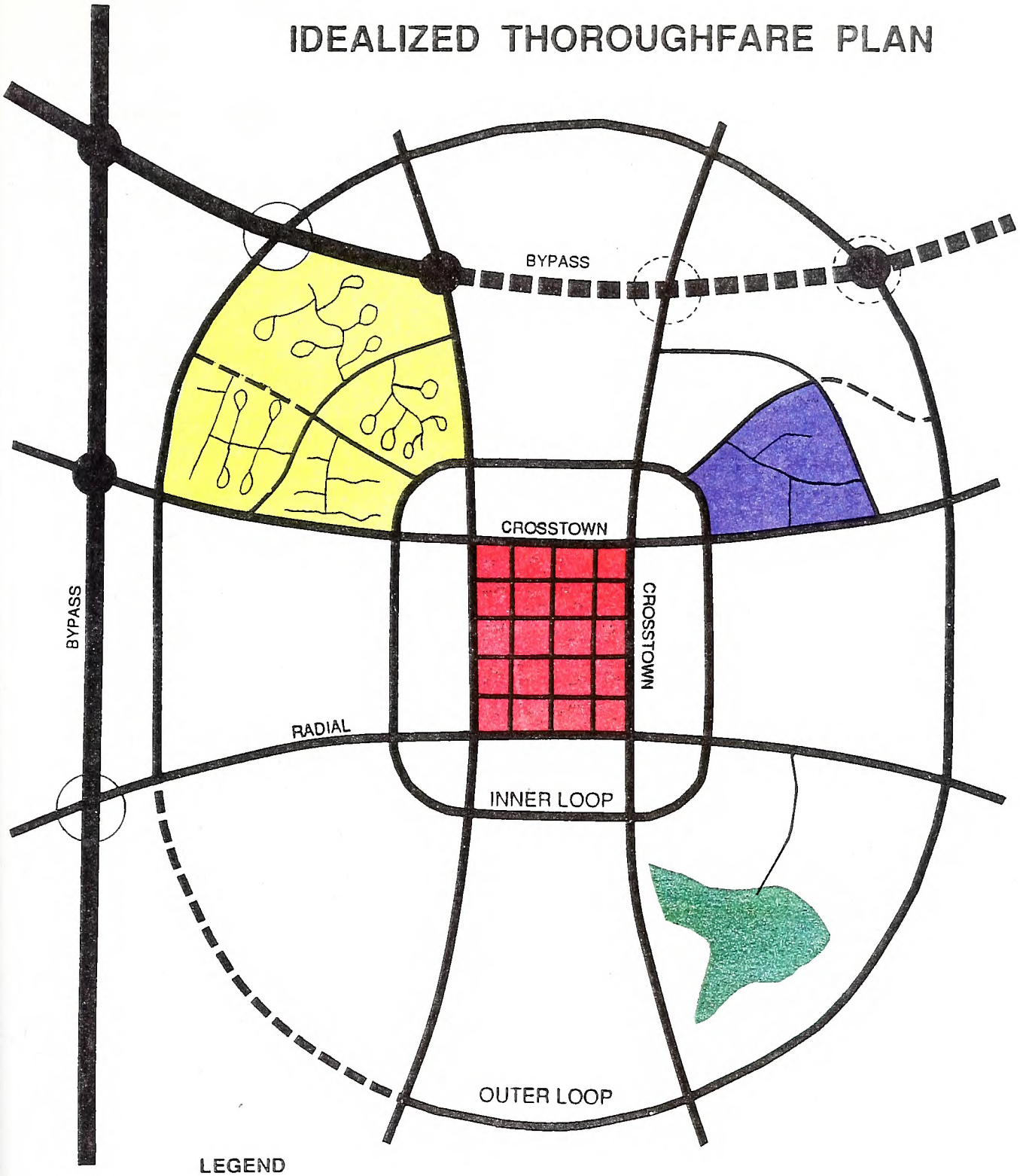
In the urban thoroughfare plan, elements are classified as major thoroughfares, minor thoroughfares, or local access streets. The major thoroughfares are the primary traffic arteries of the urban area providing for traffic movements within, around, and through the area. Minor thoroughfares are designed to collect traffic from the local access streets and carry it to the major thoroughfare system. Local access streets, which may be further classified as residential, commercial, or industrial streets, are designed only to provide access to abutting property. Due to the limited amount of detail that can be shown on a county thoroughfare plan, only urban major thoroughfares are shown.

The coordinated system of major thoroughfares that is most adaptable to the desired lines of travel within an urban area and which is reflected in most urban area thoroughfare plans is the radial-loop system. The radial-loop system includes radials, cross-towns, loops, and bypasses. Radial thoroughfares provide for travel from points outside to major destinations inside the urban area. Cross-town thoroughfares provide for traffic movement across the central area and around the central business district (CBD). Loop thoroughfares provide for lateral travel movements between suburban areas. Bypasses are designed to carry non-local traffic around and through the area. Occasionally, a bypass with low through traffic volumes can be designed to function as a portion of the urban loop. **Figure 3-A** illustrates the concepts of the radial-loop major thoroughfare system and the functionally classified urban street system.

Rural Thoroughfare Classification System

The rural system consists of those facilities outside the urban thoroughfare planning boundaries. They are classified into four major systems: principal arterials, minor arterials, major and minor collectors, and local roads. **Table 3-1** indicates generally accepted statewide mileage on these systems.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
JOR THOROUGHFARE EEWAY		
JOR OTHER		
IOR THOROUGHFARE		
CAL ROAD		
ERCHANGE		
ADE SEPERATION		

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

TABLE 1	
Rural System Road Mileage Distribution	
Systems	Percentage of Total Rural Miles
Principal Arterial System	2-4
Principal Arterial System plus Minor Arterial Road System	6-12
Collector (Major and Minor) Road System	20-25
Local Road System	65-75

Rural Principal Arterial System: This system consists of a connected network of continuous routes that serve corridor movements having substantial statewide or interstate travel characteristics. This will be indicated by both the trip lengths and the travel densities. The principal arterial system should serve all urban areas of over 50,000 population and a majority of those with a population greater than 5,000. The Interstate system constitutes a significant portion of the principal arterial system.

Rural Minor Arterial System: This system, in conjunction with the principal arterial system, forms a network that links cities, larger towns, and other major traffic generators such as large resorts. The minor arterial system generally serves intra-state and inter-county travel and travel corridors with trip lengths and travel densities somewhat less than the principal arterial system.

Rural Collector Road System: The rural collector routes generally serve intra-county travel rather than statewide travel. This system consists of those routes on which the predominant travel distances are shorter than on the arterial routes. The rural collector road system is subclassified into major and minor collector roads.

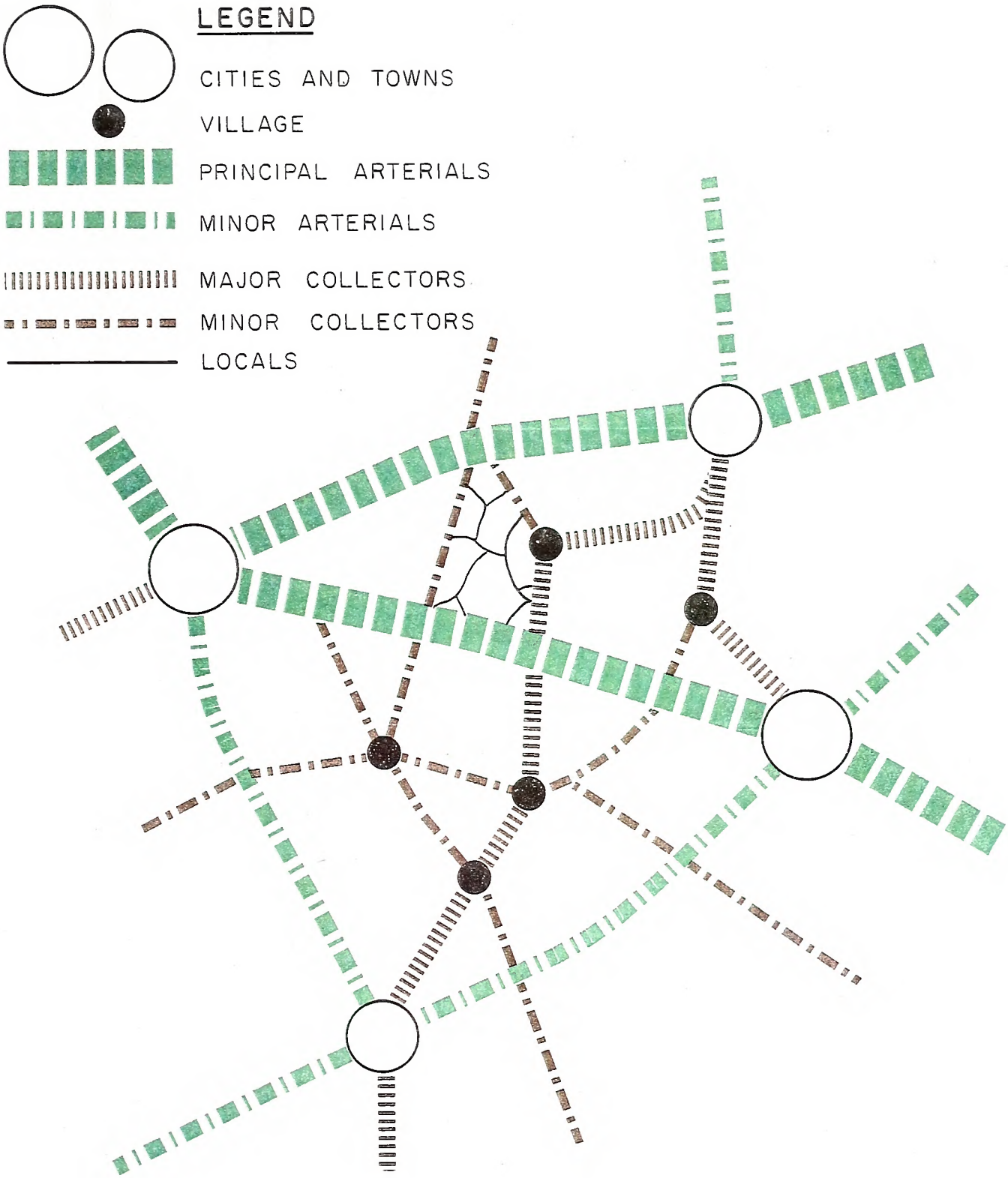
Major Collector Roads: These routes provide service to the larger towns not directly served by the higher systems and to other traffic generators of equivalent intra-county importance, such as consolidated schools, shipping points, county parks, significant mining and agricultural areas, etc. Major collector roads also link these places to routes of higher classification and serve the more important intra-county travel corridors.

Minor Collector Roads: These routes collect traffic from local roads and bring all developed areas within a reasonable distance of a major collector road; provide service to the remaining smaller communities; and link the locally important traffic generators with the rural outskirts.

Rural Local Road System: The local roads are comprised of all roads that are not on a higher system. Local residential subdivision streets and residential collector streets are elements of the local road system. Local residential streets are either cul-de-sacs, loop streets less than 2,500 feet in length, or streets less than one mile in length that do not connect thoroughfares or serve major traffic generators and do not collect traffic from more than one hundred dwelling units. Residential collector streets serve as the connecting street system between local residential streets and the thoroughfare system.

Figure 3-B gives a schematic illustration of a functionally classified rural highway system. **Figure 3-C** shows the functional classification of the major roads in Alexander County.

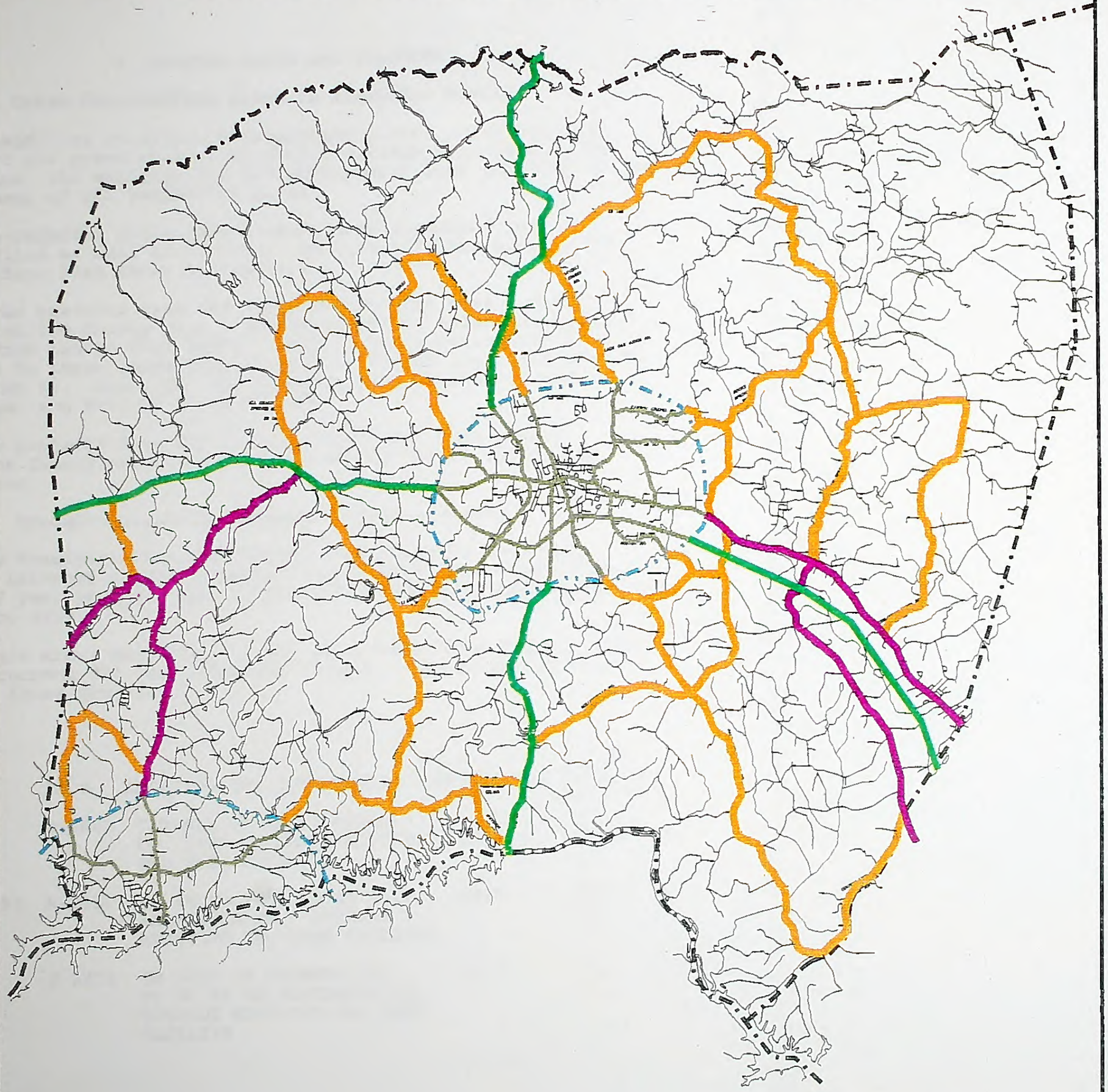
FIGURE



SCHEMATIC ILLUSTRATION
OF FUNCTIONALLY CLASSIFIED
RURAL HIGHWAY NETWORK

FIGURE 3-C

ALEXANDER COUNTY FUNCTIONAL CLASSIFICATION



LEGEND

- *INTERSTATE*
- *PRINCIPAL ARTERIAL*
- *MINOR ARTERIALS*
- *MAJOR COLLECTOR*
- *MINOR COLLECTOR*
- *URBAN THOROUGHFARES*
- *URBAN PLANNING BOUNDARY*
- *COUNTY LINE*

0 3

SCALE IN MILES

4. RELATED PLANS AND PROJECTS

Urban Thoroughfare plans in Alexander County

In addition to County Thoroughfare plans, plans are also developed for urban areas. To obtain maximum efficiency from both plans, the municipality and county must work together in the development of the respective plans.

Thoroughfare Plans have already been developed for Taylorsville as well as Hickory. Taylorsville has adopted the Thoroughfare Plan shown in figure **4-A**.

Three projects from the Taylorsville plan have a direct bearing on the County plan. The first is the widening of NC 90 bypass from two to four lanes. Next is the widening of NC 90 business to three lanes from SR 1422 to Boston Road, and from SR 1188 to NC 16. Also, NC 16 widening from SR 1607 to Fifth Avenue SW, and from NC 90 to SR 1326.

Two projects from the Hickory Urban Plan that affect Alexander County are widening NC 16 and NC 127 to multi-lane facilities.

Transportation Improvement Program Projects

The Transportation Improvement Program (TIP) contains funding information and schedules for transportation projects over a 7 year period. The current TIP gives this information for 1996 thru 2002.

There are 7 projects, as well as 4 identified future needs, in the current TIP for Alexander County. The following is a list of those projects.

ROUTE	ID #	LOCATION AND DESCRIPTION	LENGTH (KM)	SCHEDULE
NC 16	R-2403	CATAWBA RIVER TO WILKES CO. LINE. UPGRADE EXISTING TWO LANE FACILITY	23.3	IFN
US64-NC90	R-2550	NC 18 TO WEST OF SR 1313 ALEXANDER CO. UPGRADE EXISTING TWO LANE FACILITY	29.3	IFN
NC 127	R-2412	SR 1400 IN CATAWBA CO. TO NC 90 IN ALEXANDER CO. UPGRADE EXISTING TWO LANE FACILITY	16.9	IFN

SR 1143 SR 1756	R-2918	SR 1751 IN CALDWELL CO. TO NC 127 IN ALEXANDER CO. UPGRADE EXISTING TWO LANE FACILITY IN ALEXANDER CO. AND CONSTRUCT A TWO LANE FACILITY IN CALDWELL CO. ON NEW LOCATION.	5.6	IFN
NC 16	B-2208	CATAWBA RIVER. REPLACE BRIDGE NO. 139		UC
SR 1001	B-3100	SOUTH YADKIN RIVER REPLACE BRIDGE NO. 27		ROW 00 CON 01
SR 1313	B-3101	MUDDY FORK CREEK. REPLACE BRIDGE NO. 78		ROW 00 CON 01
SR 1628	B-3402	THIRD CREEK. REPLACE BRIDGE NO. 154		ROW 01 CON 02
SR 1632	B-3102	THIRD CREEK. REPLACE BRIDGE NO. 284		ROW 00 CON 01
SR 1756	B-2118	UPPER LITTLE RIVER. REPLACE BRIDGE NO. 99		UC
COUNTY- WIDE	E-3143	BICYCLE ROUTE MAPPING AND SIGNING.		MAP 97

ROW: RIGHT OF WAY ACQUISITION DATE
CON: CONSTRUCTION DATE
UC: UNDER CONSTRUCTION
IFN: IDENTIFIED FUTURE NEED

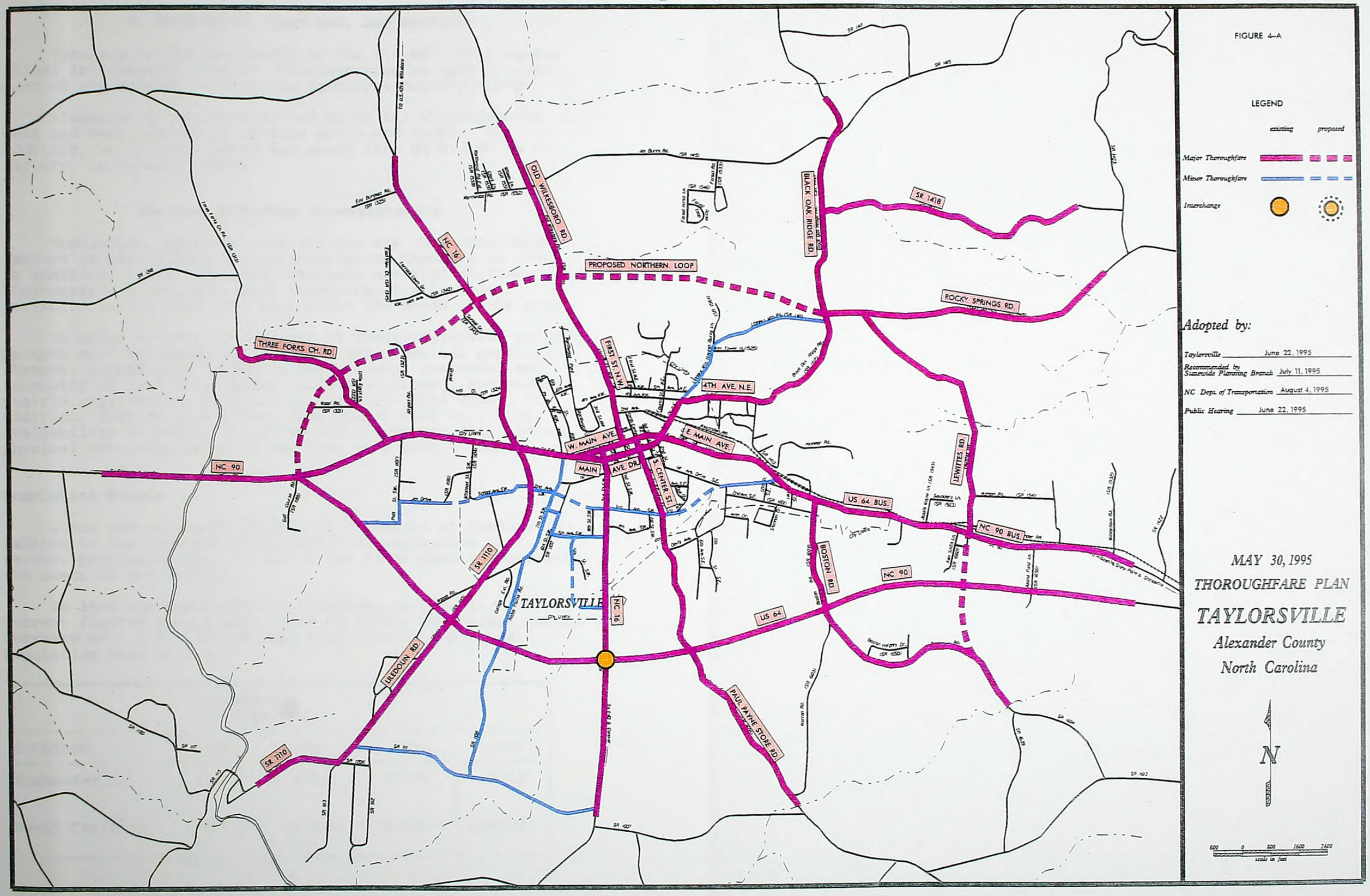


FIGURE 4-A
LEGEND
existing
proposed
Major Thoroughfare
Minor Thoroughfare
Interchange
Adopted by:
Taylorsville June 22, 1995
Recommended by Statewide Planning Branch July 11, 1995
NC Dept. of Transportation August 4, 1995
Public Hearing June 22, 1995
MAY 30, 1995
THOROUGHFARE PLAN
TAYLORSVILLE
Alexander County
North Carolina
N
OLD WILKESBORO RD.
BLACK OAK RIDGE RD.
SR 1418
PROPOSED NORTHERN LOOP
ROCKY SPRINGS RD.
THREE FORKS CH. RD.
NC 16
FIRST ST. N.W.
4TH AVE. N.E.
W. MAIN AVE.
E. MAIN AVE.
MAIN AVE. DR.
S. CENTER ST.
NC 90
US 64 BUS.
LEWITTES RD.
NC 90 BUS.
SR 1110
BOSTON RD.
NC 90
TAYLORSVILLE
US 64
ULEDOUN RD.
PAUL PAYNE STORE RD.
SR 1110

5. POPULATION, LAND USE, AND TRAFFIC

Farmland covers two-thirds of the 674 km^2 (259 square miles) in Alexander County. Manufacturing is also a large part of the economy, especially furniture manufacturing.

Alexander County is bisected by US 64/ NC 90 running east and west, and NC 16 running north and south. In addition, NC 127 runs north and south from US 64/ NC 90 to Hickory, in Catawba County.

Factors Affecting Transportation

Population, land use, and traffic are the three major factors in determining the transportation needs of an area. In addition, travel type and frequency are also studied. The Thoroughfare planning process incorporates all these variables into a plan that best meets the needs of the area.

In order to make predictions of these variables, several factors must be examined. Historic and potential population changes, significant trends in the economy, character and intensity of land development, nature of travel, and motor vehicle registration were all analyzed for this study. In addition, factors that affect development such as zoning, availability of public utilities and transportation, and the physical characteristics of the land were also studied.

Population Trends

Since the volume of traffic on a section of roadway is related to the size and distribution of population that it serves, population data is one of the tools used to determine the needs of the system.

In 1980 the population of Alexander County was 24999. Current figures show a population of 29042, an average annual increase of 1.2 %. In the same time period, the State population rose by 1.8 %.

TABLE 5-1
POPULATION

LOCATION	1980	1985	1990	1993
Alexander Co	24999	26348	27544	29042
North Carolina	5880000	6254998	6628000	6949095

Employment

Employment has grown by an average rate of 2.75 %. The growth has been sporadic, though, with no observable pattern. In 1993, there were 15323 persons living in Alexander County who were employed. However, there were only 9786 jobs in the County. This difference shows that many people who reside in Alexander County must travel outside the County for work.

TABLE 5-2
EMPLOYMENT

Year	Employment	Annual Growth Rate
1987	8285	----
1988	8891	7.3 %
1989	9531	7.2 %
1990	9572	0.4 %
1991	9295	-2.9 %
1992	9689	4.2 %
1993	9786	1.0 %

Land Use

Traffic generation is closely related to land use. For instance, a shopping center will generate more traffic than a housing subdivision. Existing and expected future land uses were analyzed for this study.

For Transportation Planning, land use is grouped into the following categories:

Residential- all land devoted to the housing of people with the exception of hotels and motels;

Commercial- all land devoted to retail trade including consumer and business services and their offices;

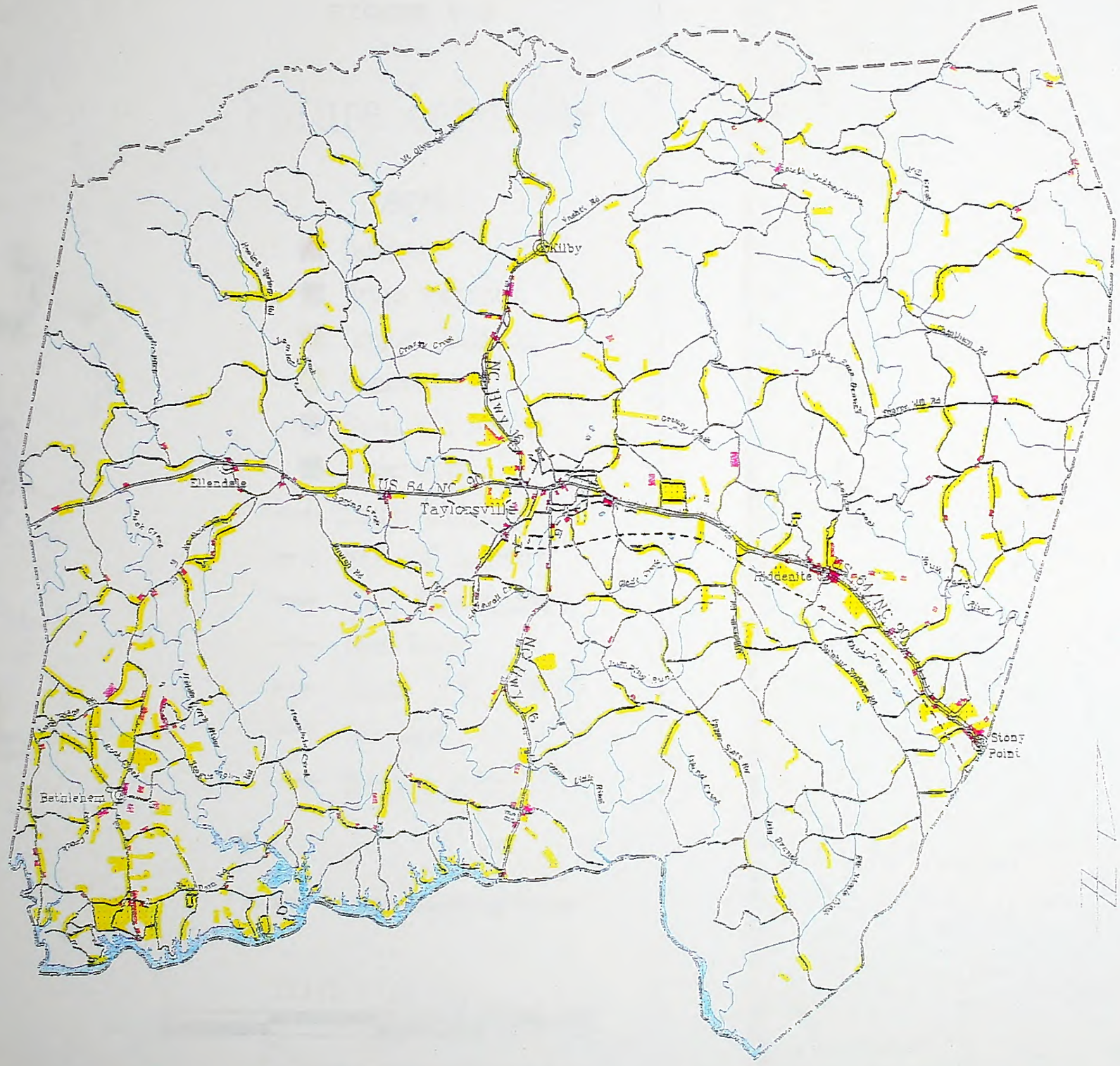
Industrial- all land devoted to manufacturing, storage, warehousing, and transportation of products;

Public- all land devoted to social, religious, educational, cultural, and political activities.

As discussed in the Alexander County Land Development Plan, commercial and industrial development will most likely occur along US 64 and NC 127. In addition, residential development will continue to occur in and around the Bethlehem area, spreading east towards NC 16.

FIGURE 5-A

Existing Land Use



Legend

- Residential
- Commercial
- Industrial
- Institutional
- Agricultural / Open Space
- County Boundary
- Municipal Boundary
- U.S. & State Highways
- Local Roads
- Future US 64 / NC 90
- Rail Lines
- Rivers or Creeks

Reprinted from Alexander County Land Use Plan

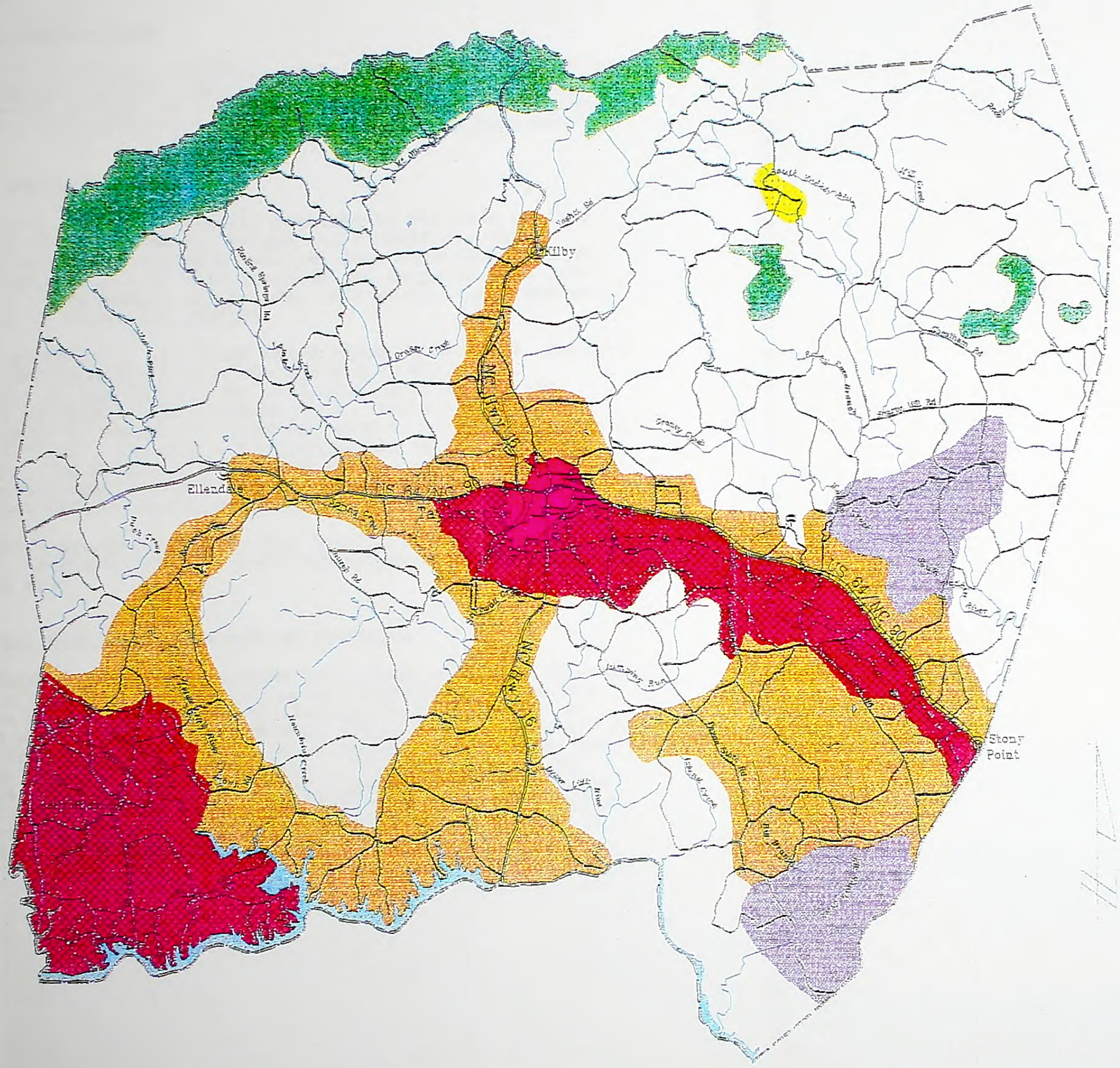
SCALE 1:120,000

0 10000 20000 30000 40000 FEET

Map produced by The North Carolina Division of Community Assistance

FIGURE 5-B

Future Land Use



Legend

- Developed
- Urban Transition
- Limited Transition
- Community
- Rural with Services
- Conservation
- County Boundary
- Municipal Boundary
- U.S. & State Highways
- Local Roads
- Future US 64 / NC 90
- Rail Lines
- Rivers or Creeks

Reprinted from Alexander County Land Use Plan

SCALE 1:120,000

Map produced by The North Carolina Division of Community Assistance

Vehicle Registration

On the average, growth in vehicle registration tends to mirror growth in ADT. Vehicle registration has grown at an average annual rate of 3 % since 1984. Therefore an increase in ADT of around 3 % from 1984 to 1993 would be expected.

Travel Demand

Travel demand is usually measured by portable traffic counters and recorded in average daily traffic. This information is collected at several locations in the County. The traffic counts at each location are compared with past counts to determine a trend. For this study, the trend over the last 10 years was studied.

A growth rate is chosen after studying the area. Because of the differences in land use and growth potential, Alexander County was divided into five sections for the purpose of determining a growth rate. Section one is the area around US 64 NC 90. A growth rate of 3.0 % was chosen for this area. The other sections divide the County into fourths. The northeast quadrant was assigned a rate of 2.75 %, the southeast assigned 3.5 %, the southwest 4.0 %, and the northwest section was given a rate of 2.5 %.

These growth rates are then applied to the current traffic counts to obtain future ADT projections (See figure **5-C** for ADT).

Capacity, Width and Alignment Deficiencies

North Carolina's standards for highway construction call for 3.3 meter (11 foot) lanes on all highways with traffic volumes greater than 2000 ADT (average daily traffic), or design speeds greater than 90 km/h (50 mph). A 2.4 meter (9 foot) lane width may be used on collector roads with an ADT of less than 400 vehicles per day. The minimum level of service for minor collector roads requires a 40 mph average overall travel speed during peak traffic conditions. Table **5-3** gives the generally accepted minimum tolerable lane widths in North Carolina.

Table 5-3
Minimum Tolerable Lane Widths

ADT	Principal Arterials m (ft)	Minor Arterials m (ft)	Collectors m (ft)
over 2000	3.3 (11)	3.3 (11)	3.3 (11)
400-2000	--	3.0 (10)	3.0 (10)
100- 400	--	3.0 (10)	2.7 (9)
below 100	--	--	2.7 (9)

Safety

Traffic accident data was analyzed to help determine problem areas on the highway system.

TABLE 5-4
ALEXANDER COUNTY
High Accident Intersection Locations

Road	At	Total	Severity
NC 16	SR 1135	27	15.03
NC 127	SR 1137	17	11.61
NC 16	Main St.	17	11.09
US 64	NC 16	18	8.52
Main St.	Main St.	21	7.45
First St	Main St.	25	5.34
Main St.	Third St.	18	5.02

These intersections warrant further study to determine the cause, and possible solutions. This, however, is beyond the scope of this study.

Bridge Conditions

In addition to all the inconveniences that bridge failures cause, they also represent the greatest risk of all highway failures for loss of life. For this reason it is important that bridges be built to the same standards as the highway system they serve.

The North Carolina DOT's Bridge Maintenance Unit, along with consultants, has inspected every bridge on the State Highway System. During this inspection, a sufficiency rating was assigned to each bridge. Factors used in determining the sufficiency rating include structural adequacy and safety, serviceability and functional obsolescence, essentially for public use, structure type, and traffic safety features. The result is in percentage form with 100 % being entirely sufficient. A rating of 50 % or less qualifies a bridge for Federal Replacement Funds under the National Bridge Inspection Program (Federal Highway Act 1968).

Listed below are all bridges with a sufficiency rating of 50 % or less (See figure **5-D** for locations).

BRIDGE PRIORITIES
ALEXANDER COUNTY

	#	Facility	Over	Location	Rat
1	159	SR1303	North Fork Creek	.3 Mi N of SR 1304	14.9
2	070	SR1331	Grassy Creek	.7 Mi W of NC 16	17.0
3	138	SR1608	Creek	.4 Mi S of SR 1606	21.1
4	129	SR1626	Big Branch Creek	.5 Mi E of SR 1605	22.4
5	095	SR1302	Duck Creek	.9 Mi N of SR 1301	22.5
6	077	SR1313	Lower Little River	.8 Mi W of SR 1328	23.2
7	032	SR1438	Creek	.4 Mi SE of SR 1403	28.5
8	154	SR1628	Third Creek	.5 Mi W of US 64-90	29.0*
9	290	SR1344	Kilby Creek	.3 Mi N of SR 1338	29.2
10	282	SR1302	Duck Creek	1.5 Mi N of SR 1301	29.5
11	081	SR1331	Little River	.05 Mi E of SR 1333	30.3
12	027	SR1001	S Yadkin River	.1 Mi N of SR 1403	31.0*
13	136	SR1607	Glade Creek	.1 Mi W of SR 1605	31.1
14	130	SR1605	Elk Shoals Creek	.3 Mi S of SR 1622	34.4
15	284	SR1632	Third Creek	.2 Mi E of SR 1005	36.3*
16	078	SR1313	Muddy Fork Creek	.4 Mi S of SR 1318	37.5*
17	048	SR1001	Branch S Yadkin	50 ft N of SR 1560	39.5
18	008	SR1446	Rocky Creek	.05 Mi E of SR 1001	44.4
19	126	SR1637	Third Creek	.5 Mi N of SR 1005	46.0
20	003	SR1456	S Yadkin River	.6 Mi S of SR 1473	46.5

* Included in current Transportation Improvement Program.

The following bridges received a rating of 50 % or less in the category termed functionally obsolete:

	#	Facility	Over	Location	Rat
1	092	SR1315	Lambert Creek	.5 Mi N of SR 1316	44.1
2	084	SR1310	Lower Little River	.5 Mi N of SR 1334	47.8
3	058	SR1405	Branch	.6 Mi E of NC 16	47.2

Numbers Correspond with numbers on figure **5-D** .

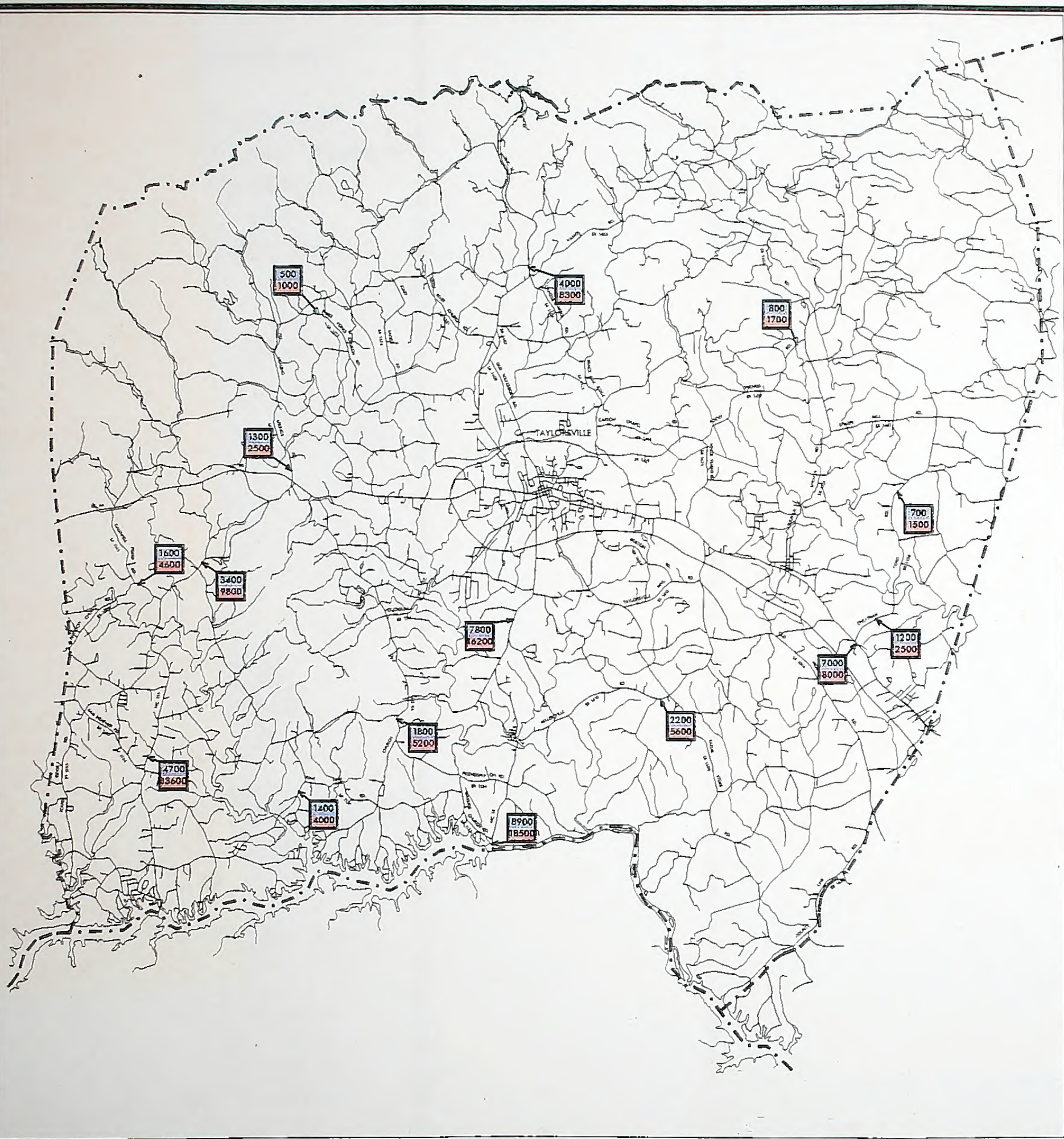


FIGURE 5-C

AVERAGE DAILY TRAFFIC COUNTS FOR ALEXANDER COUNTY

LEGEND

1993 AVERAGE DAILY TRAFFIC
2020 AVERAGE DAILY TRAFFIC

N
S

ALEXANDER COUNTY

NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATEWIDE PLANNING BRANCH - GIS UNIT

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

0 4 kilometers

0 4 miles

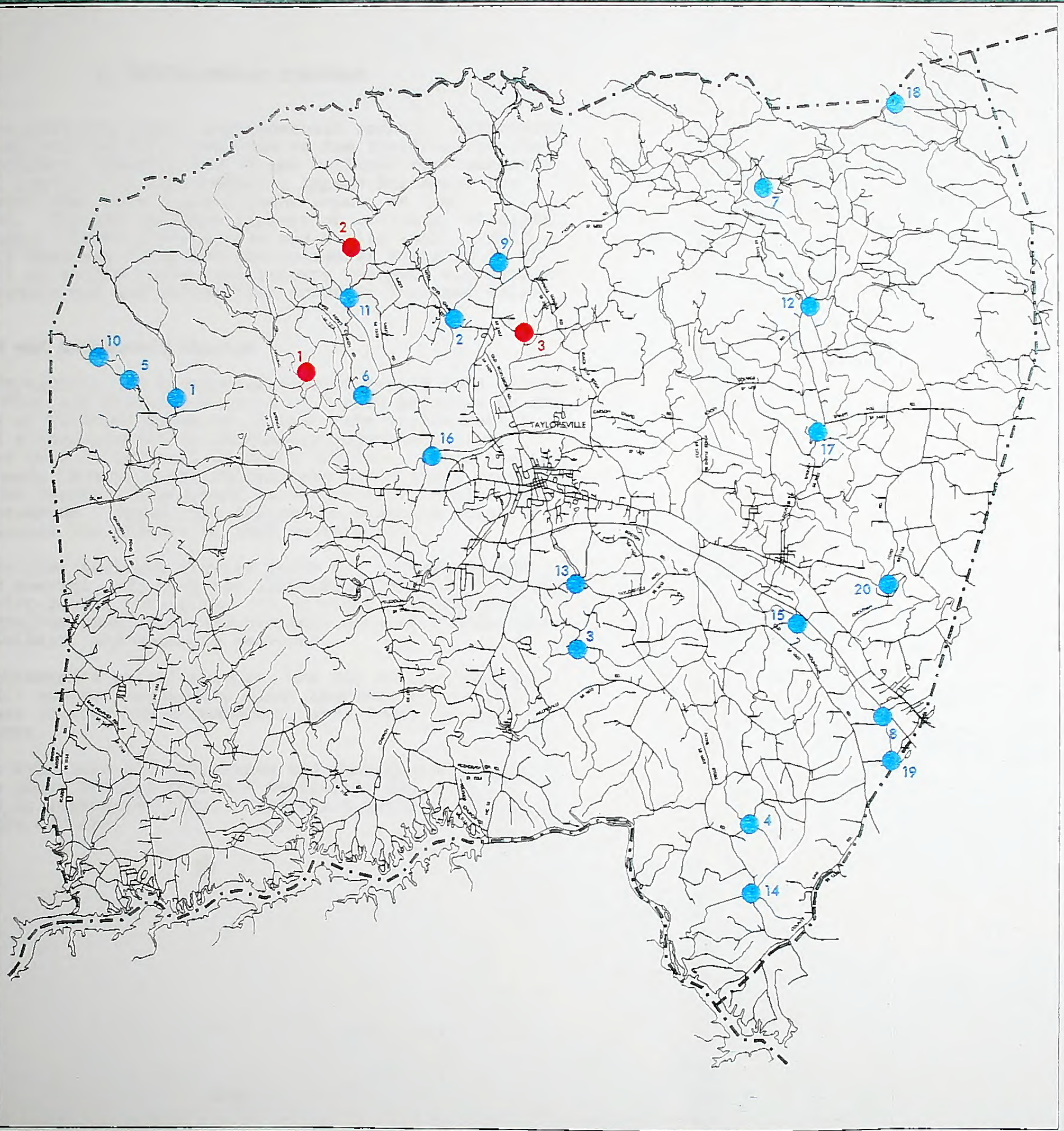


FIGURE 5–D

STRUCTURALLY DEFICIENT AND OBSELETE BRIDGES FOR ALEXANDER COUNTY

LEGEND

- STRUCTURALLY DEFICIENT
- FUNCTIONALLY OBSELETE

N

S

ALEXANDER COUNTY

NORTH CAROLINA

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

STATEWIDE PLANNING BRANCH - GIS UNIT

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL HIGHWAY ADMINISTRATION

0 4 kilometers

0 4 miles

6. ENVIRONMENTAL CONCERNS

In the past few years, environmental concerns associated with highway construction have come to the forefront of the planning process. Section 102 of the National Environmental Policy Act requires an Environmental Impact Statement for road projects that have a significant impact on the environment. The EIS includes impacts on wetlands, wildlife, water quality, historic properties and public lands. While this report does not cover the environmental concerns in as much detail as an EIS would, preliminary research was done on several factors and the information found is included below.

Threatened and Endangered Species

The Threatened and Endangered Species Act of 1973 allows the U. S. Fish and Wildlife Service to impose measures on the Department of Transportation to mitigate the environmental impacts of a road project on endangered animal and plant species, as well as critical wildlife habitats. These species and areas were located using mapping and information provided by the North Carolina Department of Environment, Health and Natural Resources. Doing this during the planning stage should minimize the effects of road construction.

The Natural Heritage Program seeks out threatened and endangered species. Species are identified, and the location is mapped for future reference. In addition, the Natural Heritage Program identifies and catalogs natural communities, special habitats, and geologic features.

One threatened animal species, the Bog Turtle (Clemmy's Muhlenbergi) and one endangered plant species, Keever's Bristle Moss (Orthotrichum Keeverae), were found in the planning area.

Table 6-1 lists all threatened and endangered species, as well as those species that are candidates for the threatened or endangered list. Appendix C defines the terms used in this section.

TABLE 6-1

	Name	Common Name	NC	US
		ANIMAL		
1.	Clemmy's Muhlenbergi	Bog Turtle	T	C2
2.	Cyprinella Zanema (pop 1)	Santee Chub	C	C2
3.	Plecotus Rafinesquii	Rafinesque's Big-Eared Bat	SC	C2
4.	Papilio Cresphontes	Giant Swallowtail	SR	-
		PLANT		
1.	Monotropsis Odorata	Sweet Pinesap	C	C2
2.	Orthotrichum Keeverae	Keever's Bristle Moss	E	C2
3.	Allium Cuthbertii	Striped Garlic	C	-
4.	Berberis Canadensis	American Barberry	SR	-
5.	Cyperus Granitophilus	Granite Flatsedge	SR	3C
6.	Spiraea Betulifolia	Shineyleaf Meadowsweet	SR	-
7.	Pellaea Wrightiana	Wright's Cliff Brake	E-SC	-
8.	Anemone Berlandier	Southern Anemone	C	-
9.	Eupatorium Incarnatum	Pink Thoroughwort	SR	-
10.	Arabis Hirsuta	Hairy Rockcress	C	-
11.	Corydalis Micrantha	Slender Corydalis	C	-

NC Descriptions:

E Endangered
T Threatened
SC Special Concern
C Candidate
SR Significantly Rare
W Watch List
P Proposed

US Descriptions

E Endangered
T Threatened
SC Special Concern
C1 Candidate 1
C2 Candidate 2
3A Candidate 3A
3B Candidate 3B
3C Candidate 3C
P Proposed

NOTE: Definition of terms may be found in appendix C of this report.

In addition, there are several locations included in the Natural Heritage Program Natural Community list in the planning area. They are not currently protected by any legislative measures. However; since these areas often contain many species of rare plants and animals, future protective legislation is possible. **Table 6-2** lists these areas.

TABLE 6-2

NATURAL COMMUNITIES

		Sig	Bio	Owner
Joe, Little Joe Mountains	Moravian Falls	A	B1	Prv TNC
Little Mountain	Moravian Falls	A	B1	Prv
Buzzard Dome	Moravian Falls Gilreath	B	B2	Prv
Prickly Pear Mountain	Gilreath	B	B2	
Rocky Face Mountain	Hiddenite	B	B2	Prv FEL
Sugarloaf Mountain	Moravian Falls	B	B2	Prv
Bald Rock Mountain	Moravian Falls	C	B3	Prv

Sig: Site Significance

A National Significance
B Statewide Significance
C Regional Significance

Bio: Biological Diversity

B1 Outstanding
B2 High Significance
B3 Moderate Significance

Owner

Prv Private
FEL Felburn Foundation
TNC The Nature Conservancy

Historic Sites

Section 106 of the National Historic Preservation Act requires the Department of Transportation to identify properties listed in, as well as eligible for the National Register of Historic Places. The DOT must consider the impact of its road projects on these properties and consult with the Federal Advisory Council on Historic Preservation.

NC General Statute 121-12(a) requires the DOT to identify historic properties listed on the national register, but not necessarily those eligible to be listed.

The DOT must consider impacts and consult with the North Carolina Historical Commission, but is not bound by their recommendations.

The Lucas Mansion (NRHP #857), located north of NC 90 in the Hiddenite vicinity, is the only listed property in the planning area.

Two sites have been determined eligible. They are The Hiddenite Milling Company Bank in Hiddenite and the Pritchard Farm Complex (FHWA) (See **fig. 6-A** for locations). The recommendations in the Alexander County Thoroughfare Plan have no negative effect on these properties.

Archaeological Sites

There are several Archaeological sites in Alexander County, mostly concentrated in the new 64/90 project area. In addition, there are recommended study areas in various parts of the County. Care should be taken regarding construction in these areas.

Wetlands

The United States Department of the Interior has completed National Wetlands Inventory Mapping for Alexander County. Most of the wetland areas are small in size. Still, future projects should be planned to minimize the effects on these areas.

Watersheds

There are three public supply watersheds in Alexander County. They are the Lake Hickory Watershed in the southwest portion of the County, the Lake Norman Watershed in the far southeastern portion and the South Yadkin River Watershed located in the northeastern portion of the County. (See **fig. 6-B** for locations).

FIGURE 6-A

ENVIRONMENTAL DATA FOR ALEXANDER COUNTY

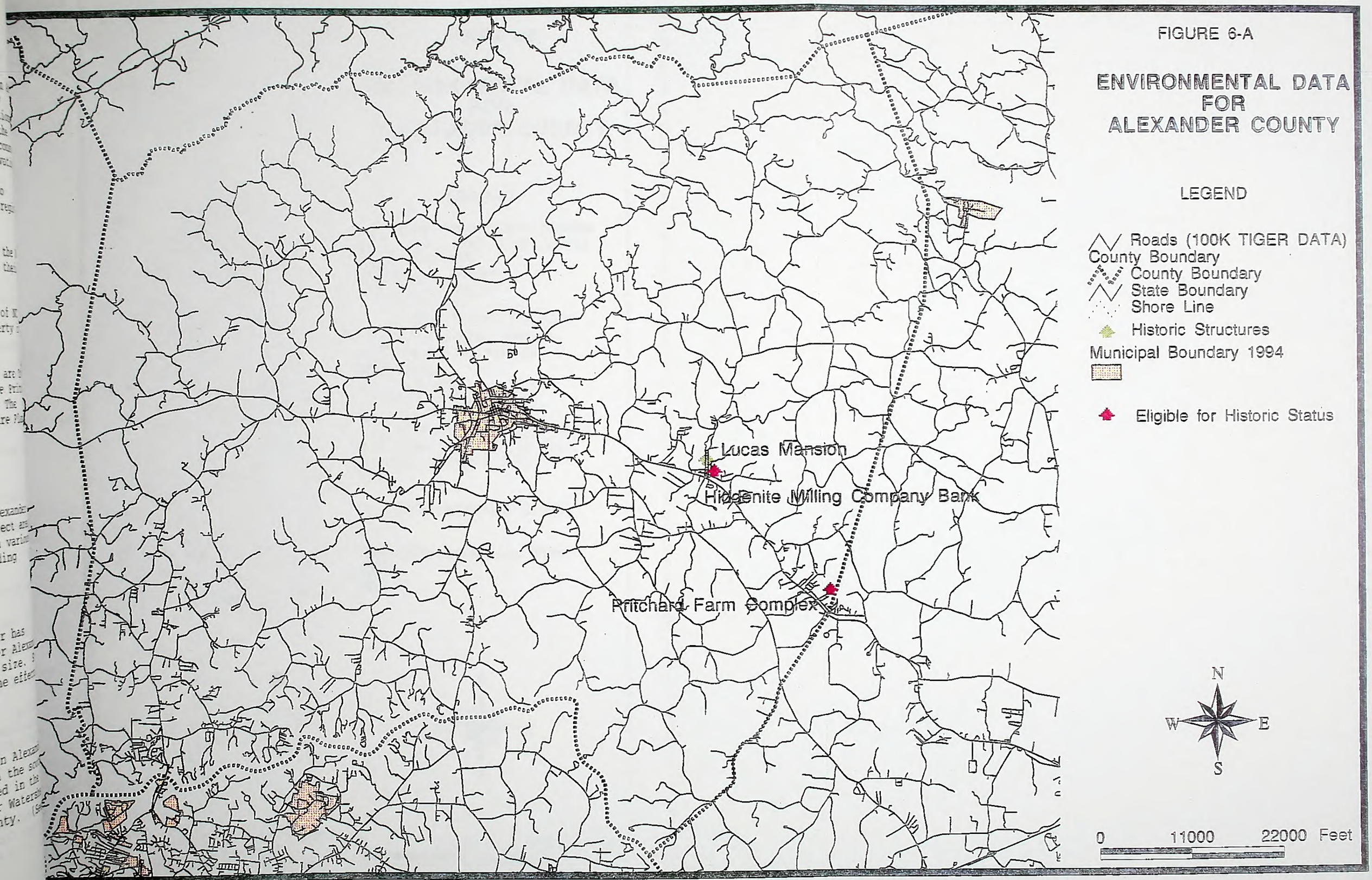
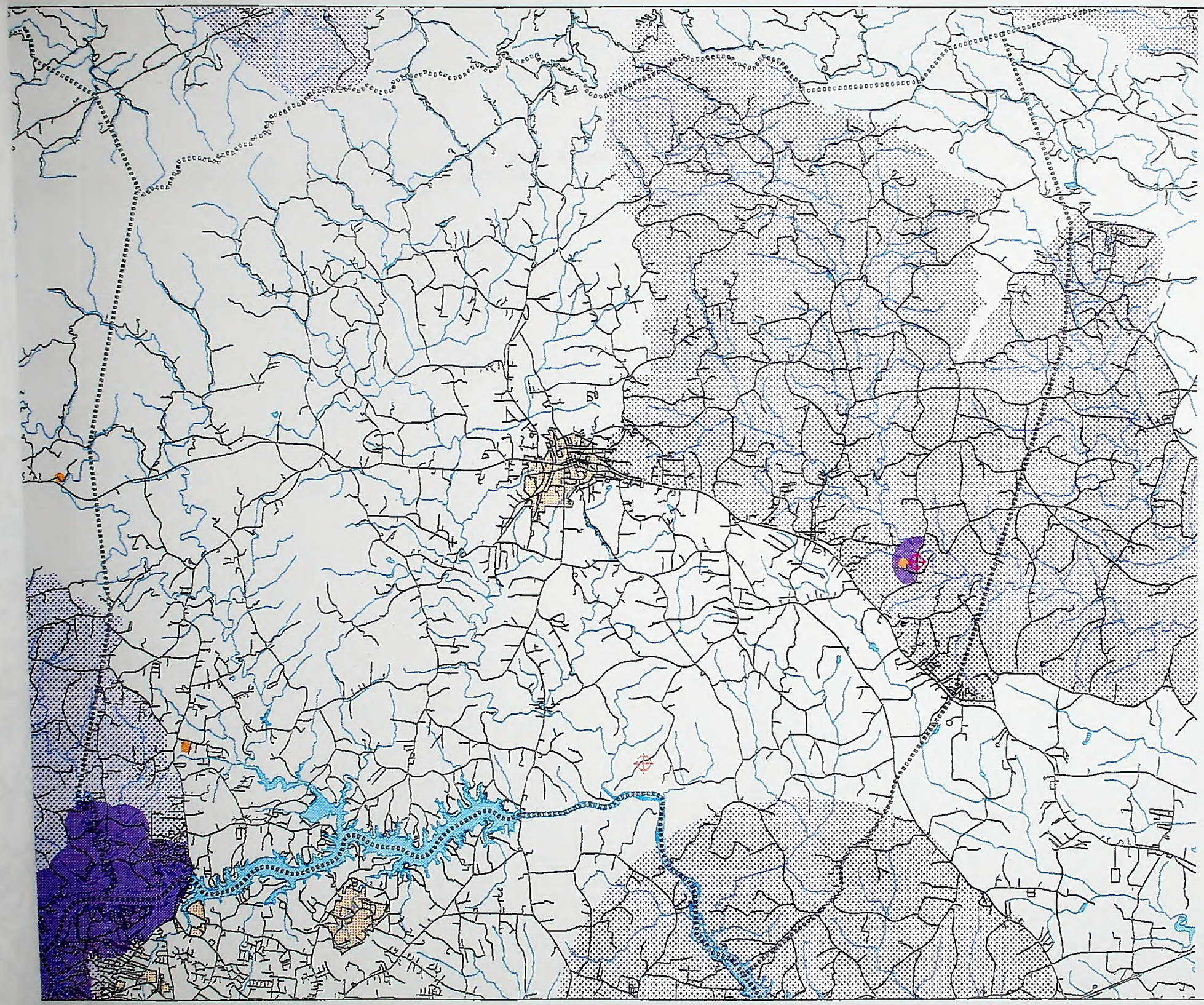


FIGURE 6-B

ENVIRONMENTAL DATA FOR ALEXANDER COUNTY



LEGEND

- Solid Waste Facility; Landfills
- Roads (100K TIGER DATA)
- County Boundary
- County Boundary
- State Boundary
- Shore Line
- Superfund Sites (As Point)
- Water Supply Intakes
- Water Supply Watersheds
  - Critical
  - Protected
- High Quality Water Zones
  - High Quality Waters
  - Outstanding Resource Water
  - Superfund Sites (As Poly)
- Municipal Boundary 1994
- 100k DEM Hyrography (Lines)
- 100k DEM Hydrography (Poly)

N
W E
S

0 11000 22000 Feet

Other

The Brushy Mountain Game Land contains almost 2500 acres of land that has been designated by the North Carolina Wildlife Resources Commission as Game Lands.

7. MUNICIPAL AND PUBLIC INVOLVEMENT

Work on the Alexander County Thoroughfare Plan officially began December 8, 1994. However, due to revisions being made to the Taylorsville Plan as well as the Hickory Plan, the Alexander County study was put in hold.

Once recommendations were made on the Hickory and Taylorsville plans, work resumed on the Alexander County plan. On June 20, 1995 the Thoroughfare Plan was presented to the Alexander County Planning Board. Questions centered around the newly completed NC 90 Bypass, and the access to land between NC 90 Business and NC 90 Bypass. These access roads would be considered local streets, therefore not included in the Thoroughfare plan. Alexander County was advised to adopt a zoning ordinance, as well as subdivision and land use controls to deal with the problem of access. The Planning Board voted to recommend the plan to the County Commissioners.

On July 17, 1995, the Thoroughfare Plan was presented to the Alexander County Commissioners. A public workshop was requested in order to give the public an opportunity to voice questions and concerns about the plan. In addition, a public hearing would be held at the Commissioners meeting following the workshop.

The workshop and public hearing were advertised in two local papers. The TIMES ran the ad on July 26 and August 2. The ADVANTAGE ran the ad on July 29 and August 5.

On August 7, 1995 a public workshop was held at the Alexander County Courthouse. There was no opposition to the proposed plan. During the public hearing, no opposition was voiced concerning the plan. The public hearing was then closed. The Commissioners read the Thoroughfare Plan Adoption Resolution, and voted unanimously to adopt the Alexander County Thoroughfare Plan as presented.

8. IMPROVEMENT PRIORITIES

The improvements to the Alexander County Thoroughfare Plan obviously cannot be undertaken all at once, nor should they be. The cost would be overwhelming and the need for many of the improvements is not immediate. In an effort to reflect the relative value of various improvements, an assessment has been made of the benefits that can be expected from each project. A comparison was then made to the projected costs involved. The result of this benefit-cost analysis is the development of a listing of priorities for those recommended improvements.

Roadway Project Priorities

Priorities have been set by comparing the benefits that will result from each roadway project to the expected project costs. Three principal measures of benefits were used: road user cost savings; the potential for increased economic development resulting from the improvement; and the environmental impact, both positive or negative, which might result. The first measure is an actual estimate of dollar savings, while the others are estimates of the probability of the resulting change.

Reduced road user costs should result from any roadway improvement, from a simple widening to the construction of a new roadway to relieve congested or unsafe conditions. Comparisons of the existing and the proposed facilities have been made in terms of vehicle operating costs, travel time costs, and accident costs. These user benefits are computed as total dollar savings over the 25 year design period using data such as project length, base year and design year traffic volumes, traffic speed, type of facility, and volume/capacity ratio.

The impact of a project on economic development potential is shown as the probability that it will stimulate the economic development of an area by providing access to developable land and reducing transportation costs. It is a subjective estimate based on the knowledge of the proposed project, local development characteristics, and land development potential. The probability is rated on a scale from 0 (none) to 1.00 (excellent).

The environmental impact analysis considers the effect of a project on the physical, social/cultural, and economic environment. **Table 8-1** lists the items that are considered when evaluating the impact on the environment. Many of these have been accounted for in evaluating the project with respect to user benefits, cost, and economic development potential. However, thirteen environmental factors are generally not considered in these evaluations. They are the environmental impacts of a project on: (1) air quality, (2) water resources, (3) soils and geology, (4) wildlife, (5) vegetation, (6) neighborhoods, (7) noise, (8) educational facilities, (9) churches, (10) parks and recreational facilities, (11) historic sites and landmarks, and

(12) public health and safety. The summation of both positive and negative impact probabilities with respect to these factors provides a measure of the relative environmental impact of a project.

TABLE 8-1
Environmental Considerations
Physical Environment
Air quality
Water Resources
Soils and Geology
Wildlife
Vegetation
Social and Cultural Environment
Housing
Neighborhoods
Noise
Educational Facilities
Churches
Parks and Recreational Facilities
Public Health and Safety
National Defense
Aesthetics
Economic Environment
Businesses
Employment
Economic Development
Public Utilities
Transportation Costs
Capital Costs
Operation and Maintenance Costs

Offsetting the benefits that would be derived from any project is the cost of its construction. A new facility, despite its high projected benefits, might prove to be unjustified due to the excessive costs involved in construction. The highway costs estimated in this report are based on the average statewide construction costs for similar project types. An estimate of anticipated right-of-way costs is also included. **Table 8-2** evaluates the proposed Alexander County projects with respect to user benefits, estimated costs, probability of economic development, and environmental impact.

To guide both the State and the County in their efforts to implement the improvements recommended in this report, the proposed projects have been placed in order of priority. These priorities are shown in **Table 8-2.** Since conditions are constantly changing with time, these priorities should be periodically reevaluated by the County and the Division Engineer. Other roadway improvements, which can be identified from Appendix A, are considered to be minor or low priority projects.

Bridge Replacement Priorities

The deficient bridges shown in **Table 8-3** were placed in three priority groups based on computer data and information supplied by the Bridge Maintenance Unit of the North Carolina Department of Transportation. Data such as the remaining life of the bridge, length, width, sufficiency rating, and traffic volume were used to determine these priorities.

BENEFITS EVALUATION FOR ALEXANDER COUNTY

PROJECT	LENGTH (MILES) [KM]	TOTAL BENEFIT (IN MILLIONS	EST COST OF $)	ECONOMIC DEVELOPMENT POTENTIAL PROBABILITY	ENVIRONMENTAL IMPACT PROBABILITY
US 64/NC 90 Taylorsville eastern planning boundary to SR 1001, widen to 3 lanes	2.1 [3.4]	116	3.6	.75	+ .30 - .30
US 64/NC 90 NC 127 to Bypass, widen to 5 lanes.	2.6 [4.2]	171	6.9	.75	+ .30 - .30
NC 127 Widen to 4 lanes Catawba Co. to US 64/NC90	7.5 [12.1]	284	19	.50	+ .30 - .30
NC 16 Widen to 4 lanes Catawba Co. to SR 1607	11.6 [18.7]	260	22	.75	+ .15 - .30

NOTE: Projects are listed by Priority, with highest priority first.

Bridge Replacement Priorities

#	Facility	Over	Location	Rat
First Priority				
159	SR1303	North Fork Creek	.3 Mi N of SR 1304	14.9
070	SR1331	Grassy Creek	.7 Mi W of NC 16	17.0
138	SR1608	Creek	.4 Mi S of SR 1606	21.1
129	SR1626	Big Branch Creek	.5 Mi E of SR 1605	22.4
095	SR1302	Duck Creek	.9 Mi N of SR 1301	22.5
077	SR1313	Lower Little River	.8 Mi W of SR 1328	23.2
032	SR1438	Creek	.4 Mi SE of SR 1403	28.5
Second Priority				
154	SR1628	Third Creek	.5 Mi W of US 64-90	29.0
290	SR1632	Kilby Creek	.3 Mi N of SR 1338	29.2
282	SR1302	Duck Creek	1.5 Mi N of SR 1301	29.5
081	SR1331	Little River	.05 Mi E of SR 1333	30.3
136	SR1607	Glade Creek	.1 Mi W of SR 1605	31.1
130	SR1605	Elk Shoals Creek	.3 Mi S of SR 1622	34.4
048	SR1001	Branch S Yadkin	50 ft N of SR 1460	39.5
Third Priority				
092	SR1315	Lambert Creek	.5 Mi N of SR 1316	44.1
008	SR1446	Rocky Creek	.05 Mi E of SR 1001	44.4
126	SR1637	Third Creek	.5 Mi N of SR 1005	46.0
003	SR1456	S Yadkin River	.6 Mi S of SR 1473	46.5
058	SR1405	Branch	.6 Mi E of NC 16	47.2
084	SR1310	Lower Little River	.5 Mi N of SR 1334	47.8

9. IMPLEMENTATION

Implementation is one of the most important aspects of the transportation plan. Unless implementation is an integral part of this process, the effort and expense associated with developing the plan is lost. There are several tools available for use by the County to assist in the implementation of the thoroughfare plan. They are as follows:

State-County Adoption of Thoroughfare Plan

It is recommended that Alexander County and the North Carolina Department of Transportation mutually approve the thoroughfare plan shown in **Figure 2-A.** The mutually approved plan may then serve as a guide for the Department of Transportation in the development of the road and highway system for the County. The approval of the plan by the County also enables standard road regulations and land use controls to be used effectively in the implementation of this plan.

Subdivision Controls

Subdivision regulations require every subdivider to submit to the County Planning Commission a plan of any proposed subdivision. It also requires that subdivisions be constructed to certain standards. Through this process, it is possible to require the subdivision streets to conform to the thoroughfare plan and to reserve or protect necessary rights-of-way for projected roads and highways that are to become a part of the thoroughfare plan. The construction of subdivision streets to adequate standards reduces maintenance costs and simplifies the transfer of streets to the State Highway System. Appendix B outlines typical subdivision design standards as they pertain to road construction.

Land Use Controls

Land use regulations are an important tool in that they regulate future land development and minimize undesirable development along roads and highways. The land use regulatory system can improve highway safety by requiring sufficient setbacks to provide for adequate sight distances and by requiring off-street parking.

Development Reviews

Driveway access to a State-maintained street or highway is reviewed by the District Engineer's office and by the Traffic Engineering Branch of the North Carolina Department of Transportation. In addition, any development expected to

generate large volumes of traffic (e.g., shopping centers, fast food restaurants, or large industries) may be comprehensively studied by staff from the Traffic Engineering Branch, Planning and Environmental Branch, and/or Roadway Design Unit of NCDOT. If done at an early stage, it is often possible to significantly improve the development's accessibility while preserving the integrity of the thoroughfare plan. Since the County is the first point of contact for developers, it is important that the County advise developers of this review requirement and cooperate in the review process.

Funding

The majority of improvements to the State highway system are scheduled and funded by the Transportation Improvement Program. The Board of Transportation regularly conducts public meetings to obtain input from the public pertaining to their needs for highway improvements.

However, not all roadway improvements are covered by this procedure. Nearly all secondary road work is done on a county by county basis. These funds, known as the county construction account, are used to pave unimproved roads, widen roadways, stabilize dirt roads, make minor alignment improvements, and even construct short connectors when appropriate. The Alexander County Commissioners are encouraged to work with the NCDOT Division Engineer when the County's priority list is developed. Many of the minor improvements recommended may be realized by using the County's construction account funds and developing the County's priority list in conjunction with the Division Engineer.

Other Funding Sources

(1) Continue to work with NCDOT to have local projects included in the Transportation Improvement Program (TIP).

(2) Lobby for the use of Discretionary Funds, which are funds that the Board of Transportation member may use at his or her discretion for area road projects.

(3) Request Industrial Access Funds, which are state funds for the construction of access roads to large industries.

APPENDIX

APPENDIX A

TYPICAL THOROUGHFARE CROSS SECTIONS

Cross section requirements for thoroughfares vary according to the desired capacity and level of service to be provided. Universal standards in the design of thoroughfares are not practical. Each street section must be individually analyzed and its cross section requirements determined on the basis of amount and type of projected traffic, existing capacity, desired level of service, and available right-of-way.

Typical cross section recommendations are shown in Figure **A1**. These cross sections are typical for facilities on new location and where right-of-way constraints are not critical. For widening projects and urban projects with limited right-of-way, special cross sections should be developed that meet the needs of the project.

Recommended typical cross sections for thoroughfares were derived on the basis of projected traffic, existing capacities, desirable levels of service, and available right-of-way. The recommended typical cross sections for the thoroughfares are given in Appendix **A** along with other pertinent information.

On all existing and proposed major thoroughfares delineated on the thoroughfare plan, adequate right-of-way should be protected or acquired for the ultimate cross sections. Ultimate desirable cross sections for each of the thoroughfares are listed in Appendix **A** . Recommendations for "ultimate" cross sections are provided for (1) thoroughfares which may require widening after the current planning period; (2) for thoroughfares which are borderline adequate and accelerated traffic growth could render them deficient; and (3) for thoroughfares where an urban curb and gutter cross section may be locally desirable because of urban development or redevelopment.

Recommended design standards relating to maximum and minimum grades, minimum sight distances, maximum degree of curve and related super elevation, and other considerations for thoroughfares are given in Appendix **B** . This Appendix gives definitions and design standards recommended for inclusion in subdivision regulations.

Cross sections "A" and "L" is typical for controlled access freeways. The 14 m (46 ft) grassed median is the minimum desirable median width, but there could be some variation from this depending upon design considerations. Right-of-way requirements would typically vary upward from 70 m (228 ft) depending upon cut and fill requirements.

Cross section "B", seven lane curb and gutter, should not be used for new projects. When the conditions warrant six lanes, cross section "D" should be recommended. Cross section "B" should be used only in special situations such as when widening from a five lane section and right-of-way is limited. Even in these situations, consideration should be given to converting the center turn lane to a median so that cross section "D" is the final cross section.

Cross section "C", five lane curb and gutter, is typical for major thoroughfares where frequent left turns are anticipated as a result of abutting development or frequent street intersections.

Cross sections "D", "E", and "M" are used on major thoroughfares where left turns and intersecting streets are not as frequent. Left turns would be restricted to a few selected intersections. The 4.9 m (16 ft) median is the minimum recommended for an urban boulevard type cross section. In most instances, monolithic construction should be utilized due to greater cost effectiveness, ease and speed of placement, and reduced future maintenance requirements. In special cases, grassed or landscaped medians may be used in urban areas. However, these types of medians result in greatly increased maintenance costs and an increased danger to maintenance personnel. Non-monolithic medians should only be recommended when the above concerns are addressed.

Cross section "F" is recommended for urban boulevards or parkways to enhance the urban environment and to improve the compatibility of major thoroughfares with residential areas. A minimum median width of 7.3 m (24 ft) is recommended with 9.1 m (30 ft) being desirable.

Typical cross section "G" is recommended for major thoroughfares where projected travel indicates a need for four travel lanes but traffic is not excessively high, left turning movements are light, and right-of-way is restricted. An additional left turn lane would probably be required at major intersections. This cross section should be used only if the above criteria is met. If right-of-way is not restricted, future strip development could take place and the inner lanes could become de facto left turn lanes.

In urban environments, thoroughfares which are proposed to function as one-way traffic carriers would typically require **cross section "H". Cross sections "I" and "J"** are usually recommended for urban minor thoroughfares since these facilities usually serve both land service and traffic service functions. **Cross section "I"** would be used on those minor thoroughfares where parking on both sides is needed as a result of more intense development.

Cross section "K" is used in rural areas or for staged construction of a wider multi-lane cross section. On some

thoroughfares, projected traffic volumes may indicate that two travel lanes will adequately serve travel for a considerable period of time. For areas that are growing and future widening will be necessary, the full right-of-way of 30 m (100 ft) should be required. In some instances, local ordinances may not allow the full 30 m (100 ft). In those cases, 21 m (70 ft) should be preserved with the understanding that the full 30 m (100 ft) will be preserved by use of building setbacks and future street line ordinances.

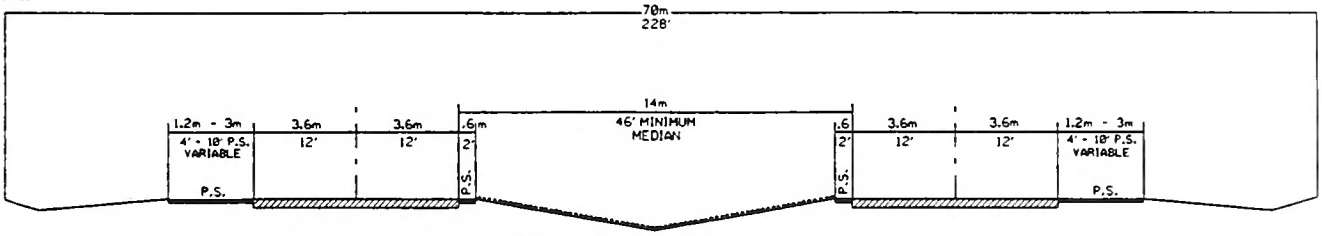
The urban curb and gutter cross sections all illustrate the sidewalk adjacent to the curb with a buffer or utility strip between the sidewalk and the minimum right-of-way line. This permits adequate setback for utility poles. If it is desired to move the sidewalk farther away from the street to provide additional separation for pedestrians or for aesthetic reasons, additional right-of-way must be provided to insure adequate setback for utility poles.

The right-of-ways shown for the typical cross sections are the minimum rights-of-way required to contain the street, sidewalks, utilities, and drainage facilities. Cut and fill requirements may require either additional right-of-way or construction easements. Obtaining construction easements is becoming the more common practice for urban thoroughfare construction.

If there is sufficient bicycle travel along the thoroughfare to justify a bicycle lane or bikeway, additional right-of-way may be required to contain the bicycle facilities. The North Carolina Bicycle Facilities Planning and Design Guidelines should be consulted for design standards for bicycle facilities. **Cross sections N, O, and P** are typically used to accommodate bicycle travel.

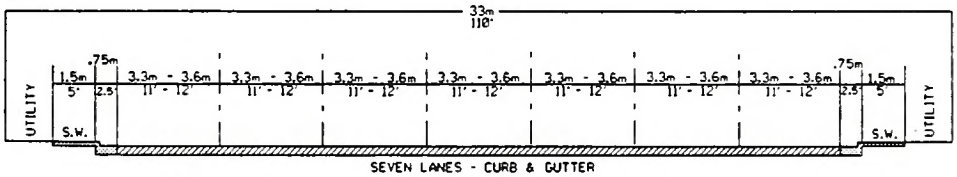
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



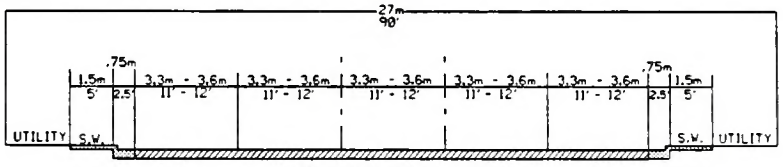
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



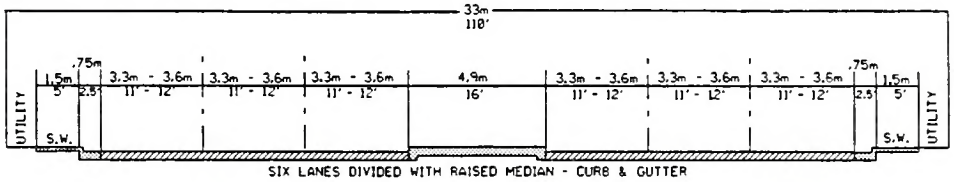
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

D.



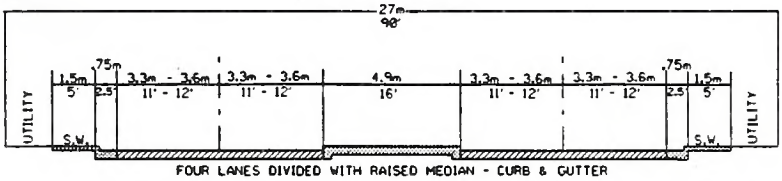
SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

FIGURE A-1

5-8-95

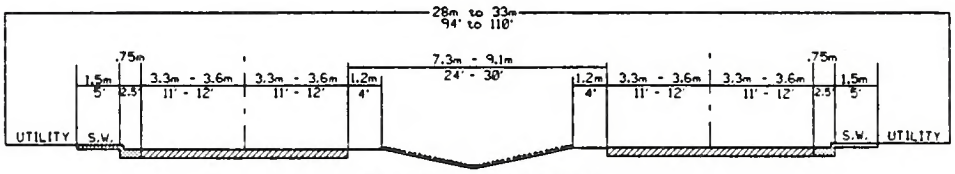
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



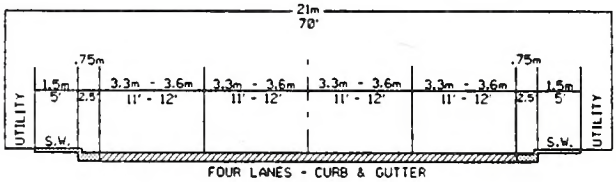
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



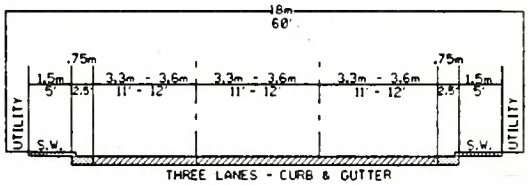
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



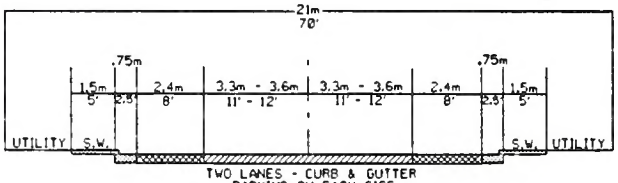
FOUR LANES - CURB & GUTTER

H.



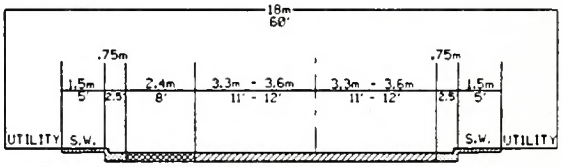
THREE LANES - CURB & GUTTER

I.



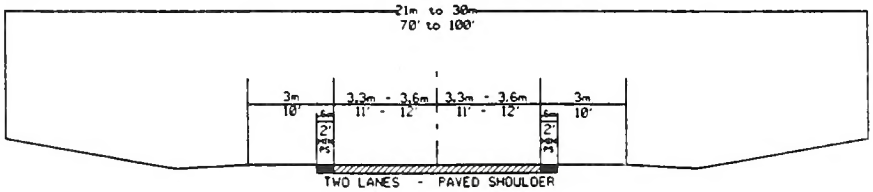
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

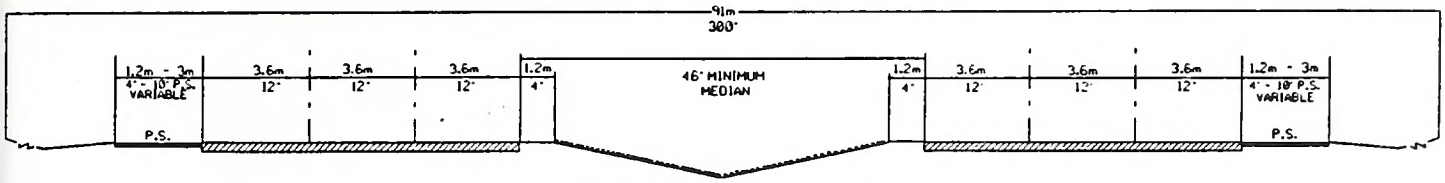
K.



TWO LANES - PAVED SHOULDER

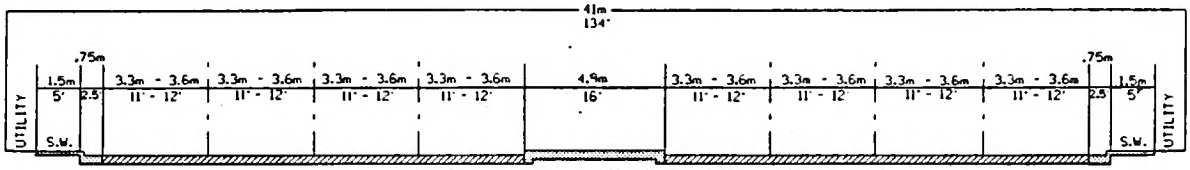
TYPICAL THOROUGHFARE CROSS SECTIONS

L.



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

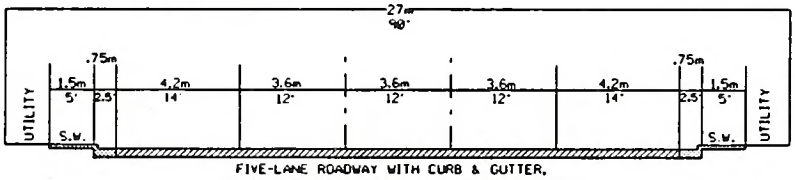
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

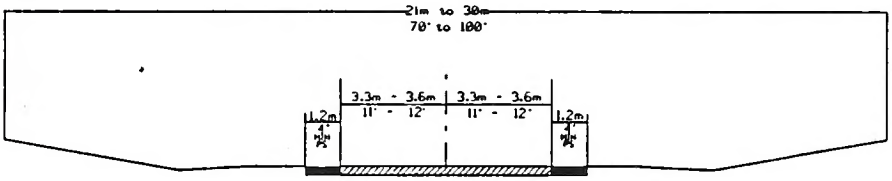
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



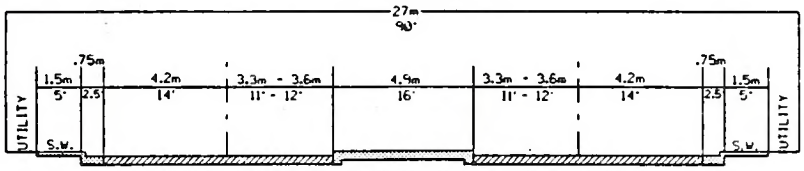
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

TABLE A1
ALEXANDER COUNTY
THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

The Street Tabulation and Recommendations on the following pages consist of a listing of roads in the County, base year and future year traffic volumes, and recommended cross sections for each facility.

Key to abbreviations:

6L	Six lanes
A through P	Refer to thoroughfare cross sections, Figure A-1
ADQ	Adequate existing situation
ADT	Average Daily Traffic, measured in vehicles per day
BRG	Bridge
CAPACITY	Volume of traffic a roadway can handle at Level of Service D
CODE	Refer to thoroughfare cross sections, Figure A-1
DIST	Distance along section of roadway, measured in meters
E, N, S, W	East, north, south, or west
ECL, NCL, SCL, WCL	Eastern, northern, southern, or western city limits
FT	Feet
KM	Kilometers (1 KM = .62 Mile)
MI	Miles
N/A	Not available
PB	Thoroughfare planning boundary
RDWY	Roadway width, measured in feet
ROW	Right-of-way width, measured in feet
RR XING	Railroad crossing
SR	Secondary road number - See Appendix B for list of associated street names
UN	Unpaved roadway
VPD	Vehicles per day

THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

FACILITY AND SECTION	EXISTING CROSS-SECTION METRIC DIST KM	RDWY M	ROW M	ENGLISH DIST MI	RDWY (FT)	ROW (FT)	PRACTICAL CAPACITY CURRENT (FUTURE)	1993 ADT	2020 (VPD)	RECOMMENDED X-SECTION METRIC RDWY (ULT)	(m) ROW (ULT)	ENGLISH RDWY (ULT.)	(ft) ROW (ULT)
US 64/ NC 90													
NC 127-CALDWELL CO	7.3	6.0	18	4.5	20	60	(10000)	5600	9300	K	ADQ	K	ADQ
NC 127- CRK PAST 1121	4.2	6.0	18	2.6	20	60	(28000)	7000	11000	C	27	C	90
SR 1121- SR 1422 SEE URBAN PLAN													
SR 1422- SR 1001	3.4	6.0	18	2.1	20	60	(21000)	7000	8000	H	21	H	70
SR 1001- SR 1456	2.9	6.0	18	1.8	20	60	(10000)	7000	8000	K	ADQ	K	ADQ
SR 1456- IREDELL CO	3.5	6.0	18	2.2	20	60	(10000)	7000	8000	K	ADQ	K	ADQ
NC 90 BYPASS													
EPL- IREDELL CO. LINE	11.2	7.2	36	6.7	24	120	(34000)	N/A	12000	A	70	A	225
NC 16													
CATAWBA CO - SR 1610	3.5	6.0	18	2.2	20	60	(31000)	8900	18500	F	34	F	110
SR 1610- SR 1613	2.9	6.0	18	1.8	20	60	(31000)	7800	16200	F	34	F	110
SR 1613- SR 1607	1.6	6.0	18	1	20	60	(31000)	7800	16200	F	34	F	110
*SR 1607- SR 1326 SEE URBAN PLAN													
SR 1326- SR 1403	4.4	6.0	30	2.7	20	100	(10000)	4800	10000	K	ADQ	K	ADQ
SR 1403- SR 1334	4.0	6.0	30	2.5	20	100	(10000)	4000	8300	K	ADQ	K	ADQ
SR 1334- WILKES CO	2.3	6.0	30	1.4	20	100	(10000)	4000	8300	K	ADQ	K	ADQ
NC 127													
SR 1147- SR 1156	1.8	6.0	30	1.1	20	100	(28000)	8300	23900	C	38	C	125
SR 1156- SR 1002	5.3	6.0	30	3.3	20	100	(28000)	4700	13600	C	38	C	125
US 64-SR 1002	5.0	6.0	30	3.1	20	100	(10000)	3400	9800	C	38	C	125
SR 1001 (SULPHUR SPRINGS RD)													
US 64-SR 1491	2.3	6.0	18	1.4	20	60	6400	900	1900	ADQ	ADQ	ADQ	ADQ
SR 1461- SR 1491	2.1	6.0	18	1.3	20	60	6400	500	1000	ADQ	ADQ	ADQ	ADQ
SR 1403-SR 1461	3.5	6.0	18	2.2	20	60	6400	500	1000	ADQ	ADQ	ADQ	ADQ
SR 1002 (ANTIOCH CH RD)													
SR 1165- CO LINE	2.4	5.4	18	1.5	18	60	(10000)	650	1900	K	ADQ	K	ADQ
NC 127- SR 1165	0.8	5.4	18	0.5	18	60	(10000)	1600	4600	K	ADQ	K	ADQ
SR 1005 (OLD MOUNTAIN RD)													
US 64-SR 1632	1.8	6.6	18	1.1	22	60	6900	1500	3800	ADQ	ADQ	ADQ	ADQ
SR 1632- IREDELL CO	6.1	6.6	18	3.8	22	60	6900	2100	5300	ADQ	ADQ	ADQ	ADQ

THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

FACILITY AND SECTION	EXISTING CROSS-SECTION METRIC DIST KM	RDWY M	ROW M	ENGLISH DIST MI	RDWY (FT)	ROW (FT)	PRACTICAL CAPACITY CURRENT (FUTURE)	1993 ADT	2020 (VPD)	RECOMMENDED X-SECTION METRIC RDWY (ULT)	ROW (ULT)	ENGLISH RDWY (UTL)	ROW (ULT)
SR 1115 (LILEDOUN RD EXT)													
SR 1124-LITTLE RIVER	2.1	5.4	18	1.3	18	60	(7400)	1500	4300	6.6	ADQ	22	ADQ
SR 1124 (CHURCH RD)													
SR 1137- SR 1115	6.0	5.4	18	3.7	18	60	(5700)	1800	5200	K	ADQ	K	ADQ
US 64-SR 1115	4.2	5.4	18	2.6	18	60	(5700)	1800	5200	K	ADQ	K	ADQ
SR 1134 (FRIENDSHIP CH RD)													
NC 16- SR 1135	1.5	6.0	18	0.9	20	60	(7100)	1500	4300	6.6	ADQ	22	ADQ
SR 1135 (WAYSIDE CHURCH RD)													
NC 16-SR 1134	2.3	5.4	18	1.4	18	60	(7400)	1200	3500	6.6	ADQ	22	ADQ
SR 1137 (RINK DAM RD)													
SR 1135-SR 1124	2.7	5.4	18	1.7	18	60	(7700)	1400	4000	K	ADQ	K	ADQ
SR 1124- LAKE	3.7	5.4	18	2.3	18	60	(7700)	1400	4000	K	ADQ	K	ADQ
SR 1144 (ICARD RIDGE RD)													
SR 1143 - SR 1157	3.9	5.4	18	2.4	18	60	(7400)	900	2600	6.6	ADQ	22	ADQ
NC 127-SR 1157	2.9	5.4	18	1.8	18	60	(7400)	900	2600	6.6	ADQ	22	ADQ
SR 1146 (BETHLEHEM SCHOOL RD)													
NC 127- SR 1144	2.3	5.4	N/A	1.4	18	N/A	(7400)	1300	3700	6.6	ADQ	22	ADQ
SR 1156 (RICHEY RD)													
NC 127- SR 1157	1.6	5.4	18	1	18	60	(8700)	2300	6300	K	ADQ	K	ADQ
SR 1157 (SAM HEAFNER RD)													
SR 1144- SR 1156	1.3	5.4	18	0.8	18	60	(8000)	1100	3200	6.6	ADQ	22	ADQ
SR 1165 (CALWELL POND RD)													
US 64-SR 1002	2.6	5.4	18	1.6	18	60	(7100)	1100	3200	6.6	ADQ	22	ADQ
SR 1307 (ALL HEALING SPRINGS RD)													
US 64- SR 1304	2.7	5.4	18	1.7	18	60	(7400)	1300	2500	6.6	ADQ	22	ADQ
SR 1304- SR 1313	2.1	5.4	18	1.3	18	60	(6700)	600	1200	6.0	ADQ	20	ADQ
SR 1313 (THREE FORKS CH RD)													
MUDDY CREEK- SR 1328	2.4	5.4	18	1.5	18	60	(6700)	500	1000	6.0	ADQ	20	ADQ
SR 1328- SR 1311	4.5	5.4	18	2.8	18	60	(6700)	500	1000	6.0	ADQ	20	ADQ
SR 1311- SR 1307	0.8	5.4	18	0.5	18	60	(6700)	500	1000	6.0	ADQ	20	ADQ

THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

FACILITY AND SECTION	EXISTING CROSS-SECTION METRIC DIST KM	RDWY M	ROW M	ENGLISH DIST MI	RDWY (FT)	ROW (FT)	PRACTICAL CAPACITY CURRENT (FUTURE)	1993 ADT	2020 (VPD)	RECOMMENDED X-SECTION METRIC RDWY (ULT)	ROW (ULT)	ENGLISH RDWY (UTL)	ROW (ULT)
SR 1328 (KIRBY LACKEY RD)													
SR 1313- SR 1331	3.7	5.4	18	2.3	18	60	(6700)	600	1200	6.0	ADQ	20	ADQ
SR 1331 (LITTLE RIVER CH RD)													
NC 16- SR 1338	2.9	5.4	18	1.8	18	60	(7300)	600	1200	6.0	ADQ	20	ADQ
SR 1338 (ST CLAIR RD)													
SR 1331- SR 1328	1.0	5.4	18	0.6	18	60	(7300)	600	1200	6.0	ADQ	20	ADQ
SR 1403 (VASHTI RD)													
SR 1001- SR 1423	2.9	6.0	18	1.8	20	60	6400	800	1700	ADQ	ADQ	ADQ	ADQ
SR 1423- SR 1432	6.9	6.0	18	4.3	20	60	6400	800	1700	ADQ	ADQ	ADQ	ADQ
NC 16-SR 1432	3.2	6.0	18	2	20	60	6400	800	1700	ADQ	ADQ	ADQ	ADQ
SR 1404 (DANIELS LUMBER RD)													
SR 1412- SR 1403	4.0	5.4	18	2.5	18	60	(6700)	N/A	3500	6.6	ADQ	22	ADQ
SR 1407 (OLD WILKESBORO RD EXT)													
NC 16-SR 1409	3.9	6.0	18	2.4	20	60	6700	500	1300	ADQ	ADQ	ADQ	ADQ
SR 1409 (OLD WILKESBORO RD)													
MUDDY FORK CK-SR 1407	1.3	5.4	18	0.8	18	60	(8700)	2100	4400	K	ADQ	K	ADQ
SR 1412 (BLACK OAK RIDGE RD)													
T'VILLE NPL- SR 1404	1.6	6.0	18	1	20	60	(7800)	1900	4000	6.6	ADQ	22	ADQ
SR 1418 (CARSON CHAPEL RD)													
T'VILLE EPL- SR 1423	0.5	5.4	18	0.3	18	60	(6600)	500	1000	6.0	ADQ	20	ADQ
SR 1419 (ROCKY SPRINGS RD)													
SR 1001- GREASY CREEK		6.0	18	3.8	20	60	7300	800	1700	ADQ	ADQ	ADQ	ADQ
SR 1422 (WHITE PLAINS RD)													
US 64- SR 1419	2.9	6.0	18	1.8	20	60	(8000)	1400	2900	6.6	ADQ	22	ADQ
SR 1423 (OLD VASHTI RD)													
SR 1418- SR 1419	0.6	5.4	18	0.4	18	60	(6600)	700	1500	6.0	ADQ	20	ADQ

THOROUGHFARE PLAN STREET TABULATION AND RECOMMENDATIONS

FACILITY AND SECTION	EXISTING CROSS-SECTION METRIC DIST KM	RDWY M	ROW M	ENGLISH DIST MI	RDWY (FT)	ROW (FT)	PRACTICAL CAPACITY CURRENT (FUTURE)	1993 ADT	2020 (VPD)	RECOMMENDED X-SECTION METRIC RDWY (ULT)	ROW (ULT)	ENGLISH RDWY (UTL)	ROW (ULT)
SR 1456 (CHEATHAM FORD RD)													
SR 1475- SR 1461	4.0	5.4	18	2.5	18	60	(7400)	700	1500	6.6	ADQ	22	ADQ
US 64- SR 1475	3.7	5.4	18	2.3	18	60	(7400)	1200	2500	6.6	ADQ	22	ADQ
SR 1461 (SHARPE MILL RD)													
SR 1460- SR 1001	1.8	6.0	18	1.1	20	60	6700	800	1700	ADQ	ADQ	ADQ	ADQ
SR 1456- SR 1460	1.3	6.0	18	0.8	20	60	6700	550	1100	ADQ	ADQ	ADQ	ADQ
SR 1503 (HIDDENITE CH RD)													
NC 90- SR 1001	1.3	5.4	15	0.8	18	50	(8000)	850	1800	6.0	18	20	60
SR 1604 (BOSTON RD)													
T'VILLE SPL- SR 1613	1.1	5.4	18	0.7	18	60	(7300)	1300	3000	6.6	ADQ	22	ADQ
SR 1605 (PAUL PAYNE STORE RD)													
SR 1607- SR 1610	4.4	6.0	18	2.7	20	60	(8000)	900	2300	6.6	ADQ	22	ADQ
SR 1610- SR 1622	4.5	6.0	18	2.8	20	60	(8000)	900	2300	6.6	ADQ	22	ADQ
SR 1622- SR 1638	4.0	6.0	18	2.5	20	60	(8000)	900	2300	6.6	ADQ	22	ADQ
SR 1610 (MILLERSVILLE RD)													
NC 16- SR 1605	4.8	6.0	18	3	20	60	(7700)	2200	5600	K	ADQ	K	ADQ
SR 1605- SR 1614	2.3	6.0	18	1.4	20	60	(7100)	1700	4300	6.6	ADQ	22	ADQ
NC 90-SR 1614	2.9	6.0	18	1.8	20	60	(7100)	1700	4300	6.6	ADQ	22	ADQ
SR 1613 (TAYLORSVILLE MFG. RD)													
SR 1605- SR 1610	3.1	5.7	18	1.9	19	60	(6100)	N/A	2500	6.6	ADQ	22	ADQ
SR 1638 (COUNTY LINE RD)													
SR 1005- SR 1605	4.8	5.4	18	3	18	60	(6700)	500	1300	6.0	ADQ	20	ADQ

Appendix B

RECOMMENDED SUBDIVISION ORDINANCES

Note: English equivalents are printed in this report merely as a guide. The English measurements were not meant to represent exact conversions, and should not be used for standards, regulations, or construction. The tables in this section were taken from the Roadway Design Metric Design Manual. In the event of conflicting information, the Standard Specifications for Roads and Structures and the Roadway Design Metric Design Manual should serve as the standard.

Appendix B

RECOMMENDED SUBDIVISION ORDINANCES

DEFINITIONS

I. Streets and Roads

A. Rural Roads

1. Principal Arterial - A rural link in a highway system serving travel, and having characteristics indicative of substantial statewide or interstate travel and existing solely to serve traffic. This network would consist of Interstate routes and other routes designated as principal arterials.

2. Minor Arterial - A rural roadway joining cities and larger towns and providing intra-state and inter-county service at relatively high overall travel speeds with minimum interference to through movement.

3. Major Collector - A road which serves major intra-county travel corridors and traffic generators and provides access to the Arterial system.

4. Minor Collector - A road which provides service to small local communities and traffic generators and provides access to the Major Collector system.

5. Local Road - A road which serves primarily to provide access to adjacent land, over relatively short distances.

B. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Inter-state, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

C. Specific Type Rural or Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 760 meters (2500 ft) in length, or streets less than 1.6 kilometers (1.0 miles) in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than 4 hectares (10 acres) where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares (2 acres) into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

	Min. ROW	
1. Rural		
a. Principle Arterial		
Freeways	105 m	(350 ft)
Other	60 m	(200 ft)
b. Minor Arterial	30 m	(100 ft)
c. Major Collector	30 m	(100 ft)
d. Minor Collector	24 m	(80 ft)
e. Local Road	18 m[1]	(60 ft)
2. Urban		
a. Major Thoroughfare other than Freeway and Expressway	27 m	(90 ft)
b. Minor Thoroughfare	21 m	(70 ft)
c. Local Street	18 m[1]	(60 ft)
d. Cul-de-sac	Variable[2]	

The subdivider will only be required to dedicate a maximum of 30 meters (100 ft) of right-of-way. In cases where over 30 meters (100 ft) of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters (100 ft). On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, principle and minor arterials, and major collectors be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than 18 meters (60 ft) in width, may be dedicated when

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[1] The desirable minimum right-of-way (ROW) is 18 meters (60 ft). If curb and gutter is provided, 15 meters (50 ft) of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 7.8 meters (26 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.2 meters (4 ft) for shoulders

2. Residential Collector
   Curb and Gutter section: 10.2 meters (34 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.8 meters (6 ft) for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h (5 mph) greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS (METRIC)			
Facility Type	Design Speed km/h Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads (ADT Over 2000)	100	80	60
Local roads including Residential Collectors and Local Residential (ADT Over 400)	80	80	60
URBAN			
Major Thoroughfares other than Freeway or Expressway	100	60	60
Minor Thoroughfares	100	50	50
Local Streets	50	50	30

DESIGN SPEEDS (ENGLISH)			
Facility Type	Design Speed mph Desirable	Minimum Level	Minimum Rolling
RURAL			
Minor Collector Roads (ADT Over 2000)	60	50	40
Local roads including Residential Collectors and Local Residential (ADT Over 400)	50	* 50	* 40
URBAN			
Major Thoroughfares other than Freeway or Expressway	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	**30	**20

* Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce min design speed.

**Based on projected ADT of 50-250.
(Reference NCDOT Roadway Design Manual page 1-1B)

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE (METRIC)				
Facility Type	Design Speed (km/h)	Maximum Grade (Percent) Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	30	7	10	12
	50	7	9	10
	65	7	8	10
	80	6	7	9
	100	5	6	8
	110	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	30	-	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	50	8	9	11
	65	7	8	10
	80	6	7	9
	100	5	6	8
Minor Thoroughfares*	30	9	12	14
	50	9	11	12
	65	9	10	12
	80	7	8	10
	100	6	7	9
	110	5	6	7
Local Streets*	30	-	11	16
	50	7	10	14
	65	7	9	12
	80	6	8	10
	100	5	6	-

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table.

(Reference NCDOT Roadway Metric Design Manual page 1-12 T-3)

MAXIMUM VERTICAL GRADE (ENGLISH)				
Facility Type	Design Speed (mph)	Maximum Grade (Percent) Flat	Rolling	Mountainous
RURAL				
Minor Collector Roads*	20	7	10	12
	30	7	9	10
	40	7	8	10
	50	6	7	9
	60	5	6	8
	70	4	5	6
Local roads including Residential Collectors and Local Residential Streets*	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-
URBAN				
Major Thoroughfares other than Freeway or Expressway	30	8	9	11
	40	7	8	10
	50	6	7	9
	60	5	6	8
Minor Thoroughfares*	20	9	12	14
	30	9	11	12
	40	9	10	12
	50	7	8	10
	60	6	7	9
	70	5	6	7
Local Streets*	20	-	11	16
	30	7	10	14
	40	7	9	12
	50	6	8	10
	60	5	6	-

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters (100 ft) each way from intersections (measured from edge of pavement) should not exceed 5%.

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* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table.

(Reference NCDOT Roadway Design Manual page 1-12 T-3)

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE (METRIC)					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	29.6	57.4	74.3	131.2	157.0
Desirable (meters)	30	70	90	170	210
Minimum K* Value for:					
Crest curve	3	9	14	43	62
Sag curve	4	11	15	30	37
Passing Sight Distance:					
Minimum Passing Dist for two lanes, in m	*	*	*	*	*

(General practice calls for vertical curves to be multiples of 10 meters. Calculated lengths shall be rounded up in each case.)
* Currently under revision.
(Reference NCDOT Roadway Metric Design Manual page 1-12 T-1)

SIGHT DISTANCE (ENGLISH)				
Design Speed, MPH	30	40	50	60
Stopping Sight Distance:				
Minimum (ft.)	200	275	400	525
Desirable (ft.)	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	60	110	190
Sag Curve	40	60	90	120
Passing Sight Distance:				
Minimum Passing Distance for 2 lanes, in feet	1,100	1,500	1,800	2,100

(General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case.)
(Reference NCDOT Roadway Design Manual page 1-12 T-1)

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* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

4. The "Superelevation Table" shown below shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE (METRIC)		
Design Speed	Maximum e*	Minimum Radius m
50 km/h	0.04	100
65	0.04	175
80	0.04	280
100	0.04	490
50	0.06	90
65	0.06	160
80	0.06	250
100	0.06	435
50	0.08	80
65	0.08	145
80	0.08	230
100	0.08	395

e = rate of roadway superelevation, meter per meter

SUPERELEVATION TABLE (ENGLISH)			
Design Speed	Maximum e*	Minimum Radius ft.	Max. Deg. of Curve
30 mph	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,637	3 45′
30	0.06	273	21 00′
40	0.06	521	11 15′
50	0.06	955	6 45
60	0.06	1,432	4 15′
30	0.08	260	22 45′
40	0.08	477	12 15′
50	0.08	819	7 30′
60	0.08	1,146	4 45′

* e = rate of roadway superelevation, foot per foot
(Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8)

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement, of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters (200 ft) between survey center lines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than 150 meters (500 ft) in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access. Alleys shall not be provided in residential subdivisions unless necessitated by unusual circumstances.

2. The width of an alley shall be at least 6.0 meters (20 ft).

3. Dead end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any construction on the street or road. The application is

available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9.0 meters (30 ft) from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters (6 ft) from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

a. Shoulder section approach

i. Under 800 ADT design year

Minimum 8.4 meters (28 ft) width face to face of parapets, rails, or pavement width plus 3.0 meters (10 ft), whichever is greater.

ii. 800 - 2000 ADT design year

Minimum 10.2 meters (34 ft) width face to face of parapets, rails, or pavement width plus 3.6 meters (12 ft), whichever is greater.

iii. Over 2000 ADT design year

Minimum width of 12 meters (40 ft), desirable width of 13.2 meters (44 ft) width face to face of parapets or rails.

b. Curb and gutter approach

i. Under 800 ADT design year

Minimum 7.2 meters (24 ft) face to face of curbs.

ii. Over 800 ADT design year

Width of approach pavement measured face to face of curbs.

Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters (1' 6"), or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m (8 ft) minimum, 3.0 m (10 ft) desirable.)

b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

APPENDIX C

Description of status abbreviations[1]

North Carolina Status:

CODE	STATUS	DEFINITION
E	ENDANGERED	Any species or higher taxon of plant whose continued existence as a viable component of the States flora is determined to be in jeopardy (GS 19B 106: 202.12). (Endangered species may not be removed from the wild except when a permit is obtained for research, propagation, or rescue which will enhance the survival of the species).
T	THREATENED	Any resident species of plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (GS 19B 106: 202.12). (Regulations are the same as for Endangered Species).
SC	SPECIAL CONCERN	Any species of plant in North Carolina which requires monitoring but which may be collected and sold under regulations adopted under the provisions of the Plant Protection and Conservation Act (GS 19B 106:202.12). (Special Concern species which are not also listed as Endangered or Threatened may be collected from the wild and sold under specific regulations. Propagated material only of Special Concern species which are also listed as Endangered or Threatened may be traded or sold under specific regulations.)
C	CANDIDATE	Species which are very rare in North Carolina, generally with 1-20 populations in the state, generally substantially reduced in numbers by habitat destruction (and sometimes also by direct exploitation or disease). These species are also either rare throughout their ranges (fewer than 100 populations total) or disjunct in North Carolina from a main range in a different part of the country or world. Also included are species which may have 20-50 populations in North Carolina, but fewer than 50 populations worldwide. These are species which have

		the preponderance of their distribution in North Carolina and whose fate depends largely on their conservation here. Also included are many species known to have once occurred in North Carolina but with no known extant occurrences in the state (historical or extirpated species); if these species are relocated in the state, they are likely to be listed as Endangered or Threatened. If present land use trends continue, candidate species are likely to merit listing as Endangered or Threatened.
SR	SIGNIFICANTLY RARE	Species which are very rare in North Carolina, generally substantially reduced in numbers by habitat destruction (and sometimes also by direct exploitation or disease). These species are generally more common somewhere else in their ranges, occurring in North Carolina peripherally to their main ranges, mostly in habitats which are unusual in North Carolina. Also included are some species with 20-100 populations in North Carolina, if they also have only 50-100 populations rangewide and are declining.
W	WATCH LIST	Any other species believed to be rare and of conservation concern in the state but warranting active monitoring at this time.
P	PROPOSED	A species which has been formally proposed for listing as Endangered, Threatened, or Special Concern, but has not yet completed the legally mandated listing process.

United States Status:

CODE	STATUS	DEFINITION
E	ENDANGERED	A taxon which is in danger of extinction throughout all or a significant portion of its range (Endangered Species Act, Section 3).

T	THREATENED	A taxon which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (Endangered Species Act, Section 3).
C1	CANDIDATE 1	Taxa for which the Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened. Development and publication of proposed rules on these taxa are anticipated; however, because of the large number of Category 1 taxa, it will take several years to clear the backlog.
C2	CANDIDATE 2	Taxa for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time... Further biological research and field study usually will be necessary to ascertain the status of these taxa... It is likely that some category 2 candidates will not warrant listing, while others will be found to be in greater danger of extinction than some taxa in category 1.
3A	CANDIDATE 3A	Taxa for which the Fish and Wildlife Service has persuasive evidence of extinction. If rediscovered, such taxa might acquire high priority for listing.
3B	CANDIDATE 3B	Names that, on the basis of current taxonomic understanding ... do not represent distinct taxa...
3C	CANDIDATE 3C	Taxa that have proven to be more abundant or widespread than previously believed and/or those that are not subject to any identifiable threat. If further research or changes in habitat indicate a significant decline in any of these taxa, they may be reevaluated for possible inclusion in categories 1 or 2.
P	PROPOSED	Taxa already proposed to be listed as endangered or threatened. Taxa formally proposed as endangered or threatened receive some legal protection. Species listed as proposed candidates are species which are in the process of being added to the federal candidate list.

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_*	POSSIBLY EXTINCT	Taxa with no known extant occurrences.

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1. Natural Heritage Program List of the Rare Plants of North Carolina. U. S. Fish and Wildlife Service 1990 (with amendments 1993).